VOLUME XV OCTOBER, 1915 NUMBER 6

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THE AMERICAN MUSEUM JOURNAL

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A STORY OF THE BALKANS
COLLECTING IN THE CONGO
ANCIENT GOLD ART
GIANT DINOSAURS FROM AMERICA

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THE AMERICAN MUSEUM JOURNAL

VOLUME XV OCTOBER, 1915 NUMBER 6

CONTENTS

Cover, Kikuyu Boy, British East Africa
Photograph by Carl E. Akeley

Series of Recent Museum Groups 266
LAYSAN ISLAND BIRD GROUP.— University of Iowa
FUR SEALS ON KITOVI ROOKERY.— American Museum of Natural History, New York
VIRGINIA DEER IN THE ADIRONDACKS.— Brooklyn Institute Museum
NEAR THE END OF A TIGER HUNT.— Bristol Museum and Art Gallery, England

Tyrannosaurus, the Largest Flesh-eating Animal that Ever Lived
BARNUM BROWN 271
With illustrations of the model for a proposed group in the American Museum and of the first mounted skeleton for this group
Story of the discovery and excavation of the petrified bones of these gigantic dinosaurs in the Bad Lands of Montana

Birds of the Congo ..... JAMES P. CHAPIN 281
Illustrations from photographs by Herbert Lang

Reproductions in Duotone of African Photographs ..... opposite 292
From the work of Herbert Lang and Carl E. Akeley

The Trail of War in Macedonia ..... DAVID STARR JORDAN 293

The Penguins of South Georgia ..... ROBERT CUSHMAN MURPHY 301
The story of the "kings," following the story of the "Johnnies" in the last issue of the JOURNAL

Ancient Gold Art in the New World ..... HERBERT J. SPINDEN 307
Collection of 15,000 specimens in gold, stone and pottery excavated from the ruins of a prehistoric city in Costa Rica — Discovery made during the clearing of a great banana plantation at Mercedes by Mr. Minor C. Keith

Frederic Ward Putnam, 1839–1915 ..... CLARK WISSLER 315
Brief review of the work of one of the most eminent of American anthropologists

Museum Notes 317
Including illustration of white rhino presented to the American Museum by Mr. John H. Prentice

MARY CYNTHIA DICKERSON, *Editor*

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LAYSAN ISLAND GROUP.— THE STATE UNIVERSITY OF IOWA

[Series of Recent Museum Groups]

Portion of cyclorama (one-tenth of it) filling one hall of the Iowa Museum. The canvas is 138 feet long and 12 feet in height and a foreground covers some 400 square feet of floor space. Laysan Island in the Pacific, with an area of less than two square miles, is the home of millions of birds

FUR SEALS AT KITOVI ROOKERY.— AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK

[*Series of Recent Museum Groups*]

Modeling of foreground and painting of canvas by Albert Operti, seals mounted some years ago by Frederick Blaschke. The view includes a part of Kitovi Rookery, St. Paul Island, known as the "amphitheater," looking northeast toward Lukanian Point. In 1897 there were 1200 seals here, but in 1877 there must have been at least 5000

VIRGINIA DEER IN THE ADIRONDACKS.— BROOKLYN INSTITUTE MUSEUM

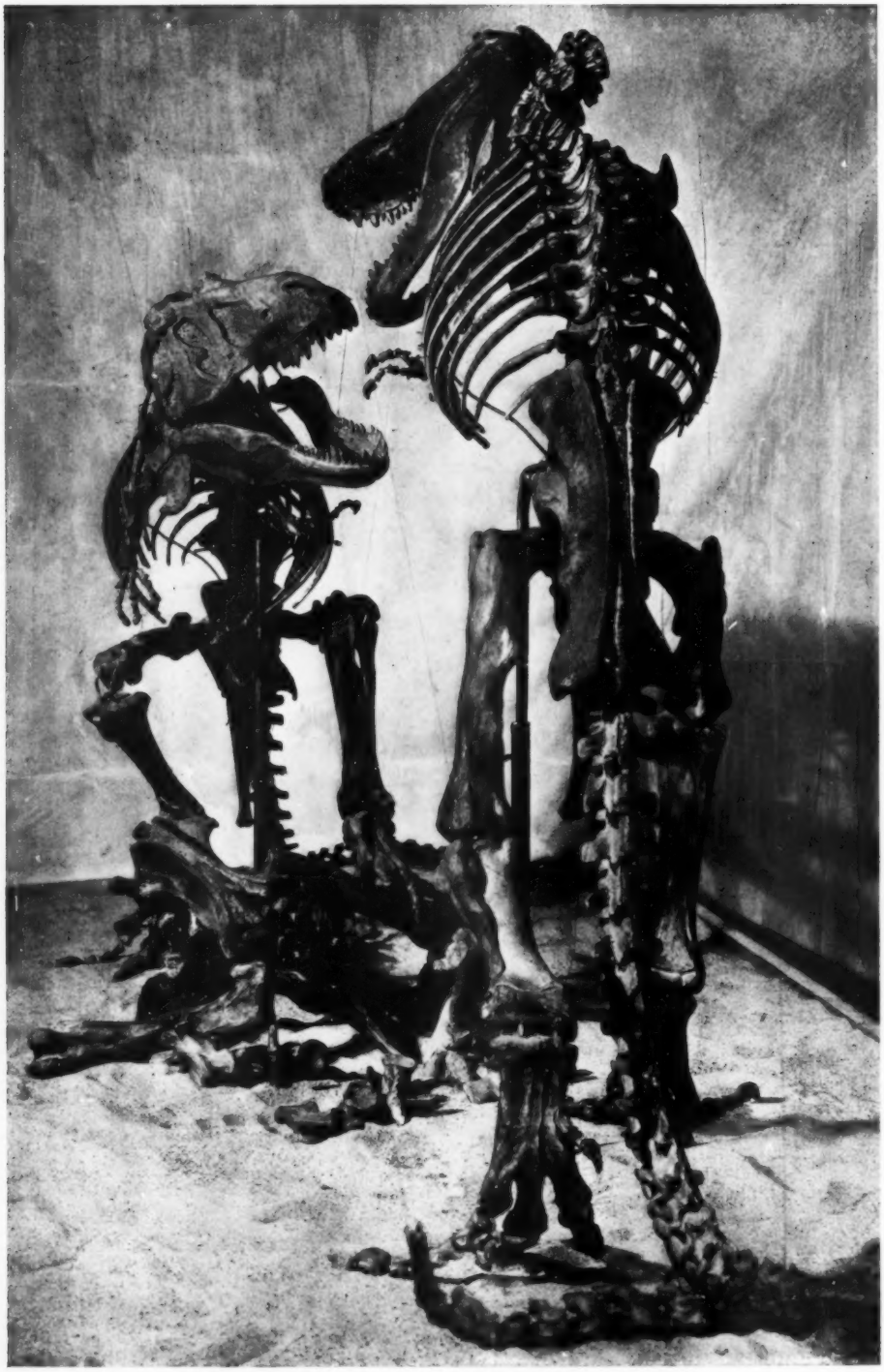
[*Series of Recent Museum Groups*]

Animals in summer pelage collected and mounted by R. H. Rockwell, landscape painted by H. B. Tschudy. The group is lighted by what seems natural daylight obtained through the use of nitrogen-filled lamps and a color screen which eliminates the excess of red and yellow rays

NEARING THE END OF A TIGER HUNT.— BRISTOL MUSEUM AND ART GALLERY, ENGLAND

[Series of Recent Museum Groups]

This tiger, shot by His Majesty, King George V, in Nepal, India, has been skillfully utilized to show the finish of a hunt when the circle of beaters has closed in and the tiger has been driven near his Royal Highness, mounted on an elephant as shown in the background



THE PROPOSED TYRANNOSAURUS GROUP FOR THE AMERICAN MUSEUM, AS SHOWN IN A REDUCED MODEL BY MR. ERWIN CHRISTMAN

THE AMERICAN MUSEUM JOURNAL

VOLUME XV OCTOBER, 1915 NUMBER 6

TYRANNOSAURUS, THE LARGEST FLESH-EATING ANIMAL THAT EVER LIVED

By Barnum Brown

DAWN glows along the shore of a lagoon near the sea three millions of years ago in Montana. The landscape is of low relief; sycamores and ginkgo trees mingle with figs, palms and bananas. There are few twittering birds in the tree-tops and no herds of grazing animals to greet the early sun.

A huge herbivorous dinosaur *Trachodon*, coming on shore for some favorite food has been seized and partly eaten by a giant *Tyrannosaurus*. Whilst this monster is ravenously consuming the carcass another *Tyrannosaurus* draws near determined to dispute the prey. The stooping animal hesitates, partly rises and prepares to spring on its opponent. With colossal bodies poised on massive hind legs and steadied by long tails, ponderous heads armed with sharp dagger-like teeth three to five inches long, front limbs exceedingly small but set for a powerful clutch, they are the very embodiment of dynamic animal force.

This is the picture conjured by a group of three fossil skeletons in the American Museum which completed will occupy a space fifty-four feet long and twelve feet wide. The erect *Tyrannosaurus* skeleton now finished measures forty-seven feet in length from tip to tip and eighteen and one-half feet in height. Larger herbivorous dinosaurs have been found in the United States and in Africa in rocks of an earlier age but their carnivorous contemporaries were at least a third smaller than *Tyrannosaurus* which we can safely state is the largest terrestrial flesh-eater of all ages.

A complete skeleton has never been found; even scattered remains are rare; but the Museum's skeletons fortunately supplement each other in such a way that bones missing in the one have been cast from the other. Only the tip of the tail and the lower part of the front limbs have been modeled from an allied form.

The discovery of these rare fossils is of peculiar interest. While hunting deer along the Missouri River some years ago, Dr. W. T. Hornaday, director of the New York Zoölogical Park, discovered several large fossil bones. One of these shown to me, I identified as part of a horn of a dinosaur *Triceratops;* and photographs which Dr. Hornaday had taken of the scene of discovery showed a striking similarity to localities in Wyoming where many Cretaceous fossils have been found.

The following year, 1902, an expedition was sent to the new locality. Our outfitting point and base of supplies was Miles City, Montana, a point on the railroad one hundred and thirty miles from the "bad lands." After five long days across measureless undulating prairie, past numerous flocks of sheep

THE GIANT CARNIVOROUS DINOSAUR TYRANNOSAURUS

The skeleton is forty-seven feet in length, and stands nineteen feet in height from the floor. The gigantic head, sharp teeth and claws all show the carnivorous adaptations and habits of the animal

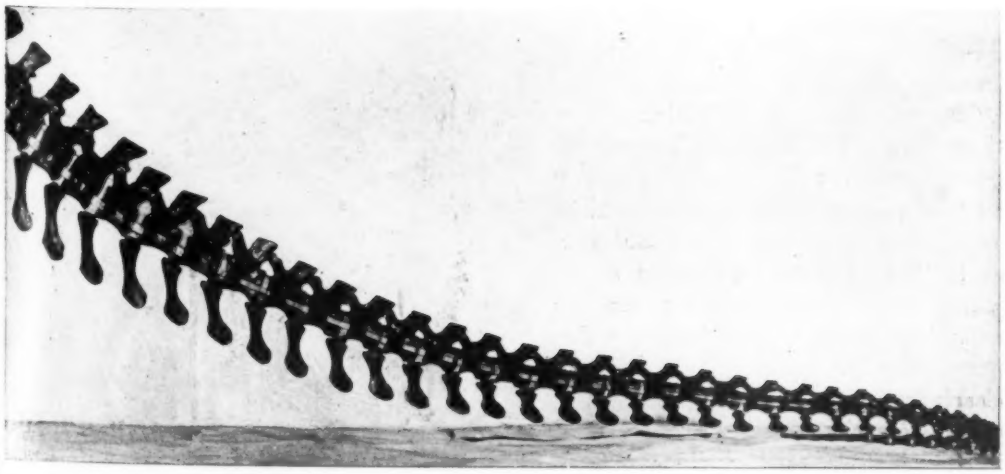
It can safely be said that *Tyrannosaurus*, which lived three millions of years ago, is the largest terrestrial flesh-eater of all ages. The skeleton is intended to form part of a group representing two Tyrannosaurs quarreling over the carcass of a *Trachodon* or duckbilled dinosaur. When the new west wing is built the Tyrannosaur group will be the central exhibit of the Cretaceous dinosaur hall. Owing to lack of space, only one skeleton can be mounted at present and this has to be placed temporarily in the Quaternary hall on the fourth floor

and fewer herds of cattle, we arrived at the little log post-office Jordan.

A few miles beyond this point at the head of the small streams tributary to the Missouri River, the prairie abruptly changes to a panorama of wonderful bad lands; a wilderness of variegated sculptured cliffs and domes intersected by deep cañons with scattered pine trees and pockets of junipers; while on the hillsides in the broader valleys, lines of cottonwoods mark the stream courses. The dullness of the denuded earth is relieved by bright-colored clay in bands traceable on the same level for miles. Hard globular sandstones of all sizes are scattered among the layers of sand, and groups of them cluster the slopes of the hills.

We established camp on Hell Creek near the old Max Sieber ranch, where the first bones had been discovered. Nearby, the stream has cut into a hill exposing rounded sandstones, many of which have rolled down to the water. Some of the stones contained bones and we traced them up the hillside by broken pieces until the original position of the layer was located. Here in the buff-colored sand half way up the hill we found the first skeleton of *Tyrannosaurus* lying in the position in which it had been interred and petrified millions of years ago.

The skeleton was disarticulated and scattered on the same level and almost every bone was separately enclosed in a bluish sandstone as hard as granite. The loose surface sand was easily removed but below the frost line the hard cemented mass was almost unyielding to a pick. The area over which the bones were scattered and the almost vertical slope of the hill necessitated removal of a vast amount of material. With additional help, plows, scrapers and dynamite we attacked the task, carving off slices of the hillside down to



SKELETON RECENTLY MOUNTED IN THE AMERICAN MUSEUM

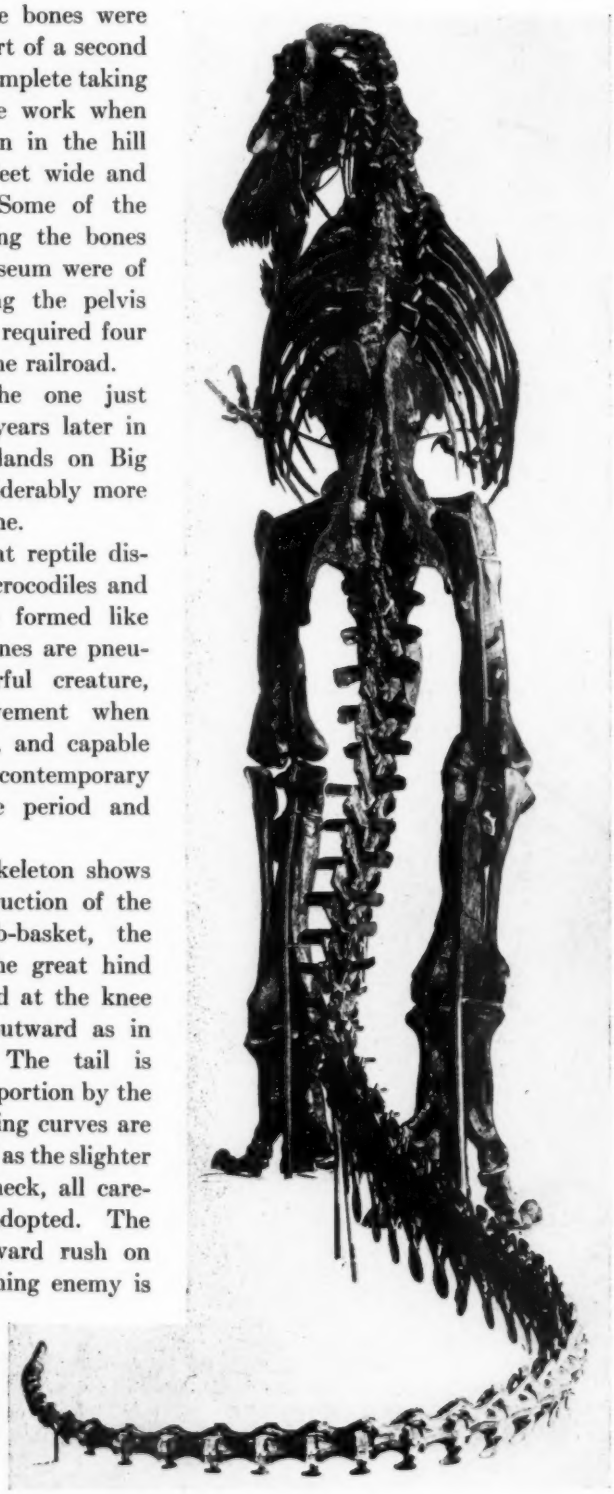
The successive expeditions under Mr. Barnum Brown in the Cretaceous of Montana and Alberta have secured for the Museum a large series of dinosaur skeletons representing all the principal types of this period. The *Tyrannosaurus* mount is regarded as the finest piece of work in this line which has yet been accomplished. The articulation and pose are the result of prolonged and thorough studies and criticism, and the mechanical problems have been solved and managed with great skill and a clear appreciation of the artistic and scientific concept which was to be executed. The mounting was done by Mr. Charles Lang under the direction of Professor Henry Fairfield Osborn and the scientific staff of the department of vertebrate palæontology

the bone layer, where the bones were taken up one by one. Part of a second summer was required to complete taking out this skeleton and the work when finished left an excavation in the hill thirty feet long, twenty feet wide and twenty-five feet deep. Some of the sandstone blocks containing the bones shipped back to the Museum were of huge size; one containing the pelvis weighed 4150 pounds and required four horses to transport it to the railroad.

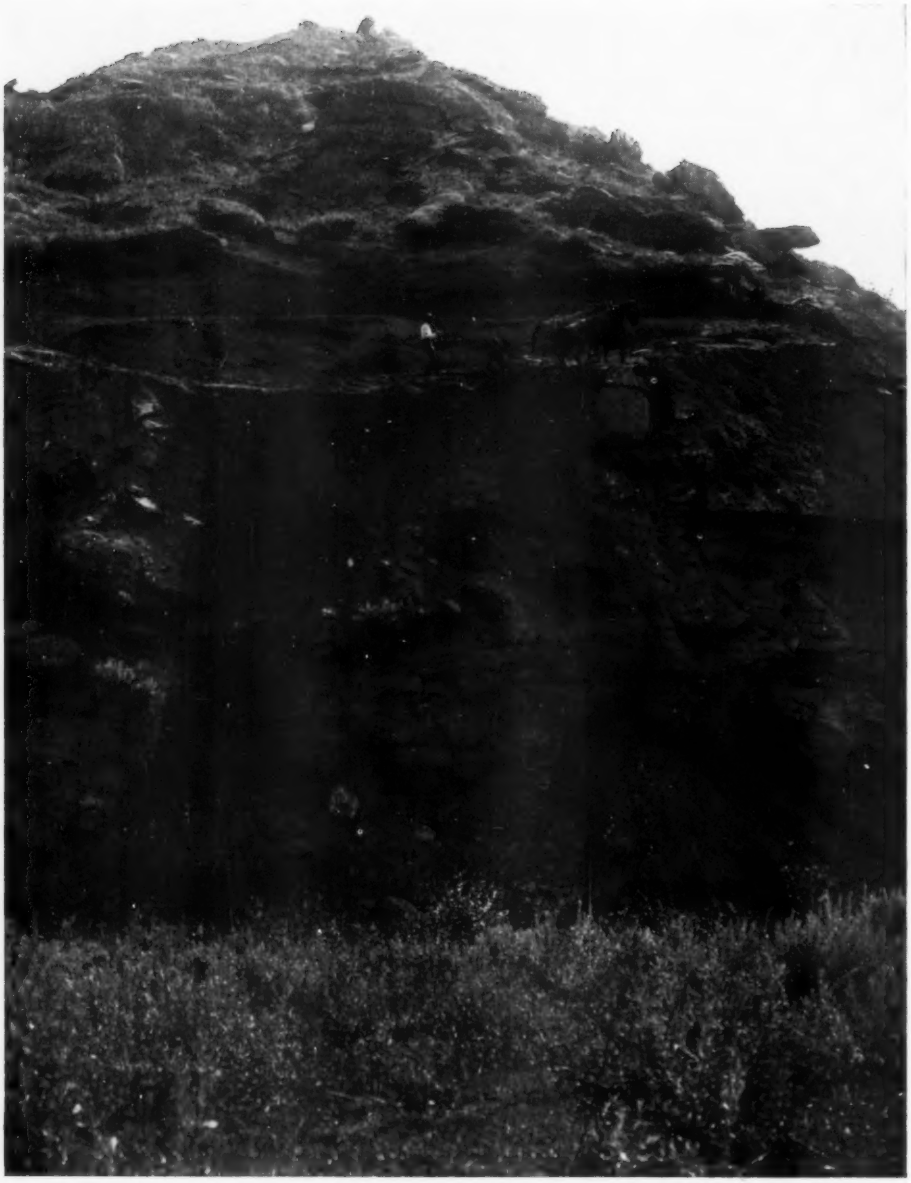
A second skeleton, the one just mounted, was found six years later in the same Montana bad lands on Big Dry Creek. This is considerably more complete than the first one.

Tyrannosaurus is a giant reptile distantly related to lizards, crocodiles and birds. Its hind legs are formed like those of birds and the bones are pneumatic. It was a powerful creature, doubtless swift of movement when occasion demanded speed, and capable of destroying any of the contemporary creatures, a king of the period and monarch of its race.

The rear view of the skeleton shows the narrow birdlike construction of the pelvis, and compact rib-basket, the massive proportions of the great hind limbs, which bend forward at the knee as in birds, instead of outward as in crocodiles and lizards. The tail is enlarged out of its due proportion by the perspective, but its sweeping curves are clearly brought out, as well as the slighter curves of backbone and neck, all carefully studied for the pose adopted. The sudden pause in its forward rush on coming close to its crouching enemy is well suggested, but the attitude could be more clearly seen if the outlines of the flesh of the body and limbs were restored.



SANDSTONE CONCRETIONS WEATHERING OUT IN THE CRETACEOUS BAD LANDS

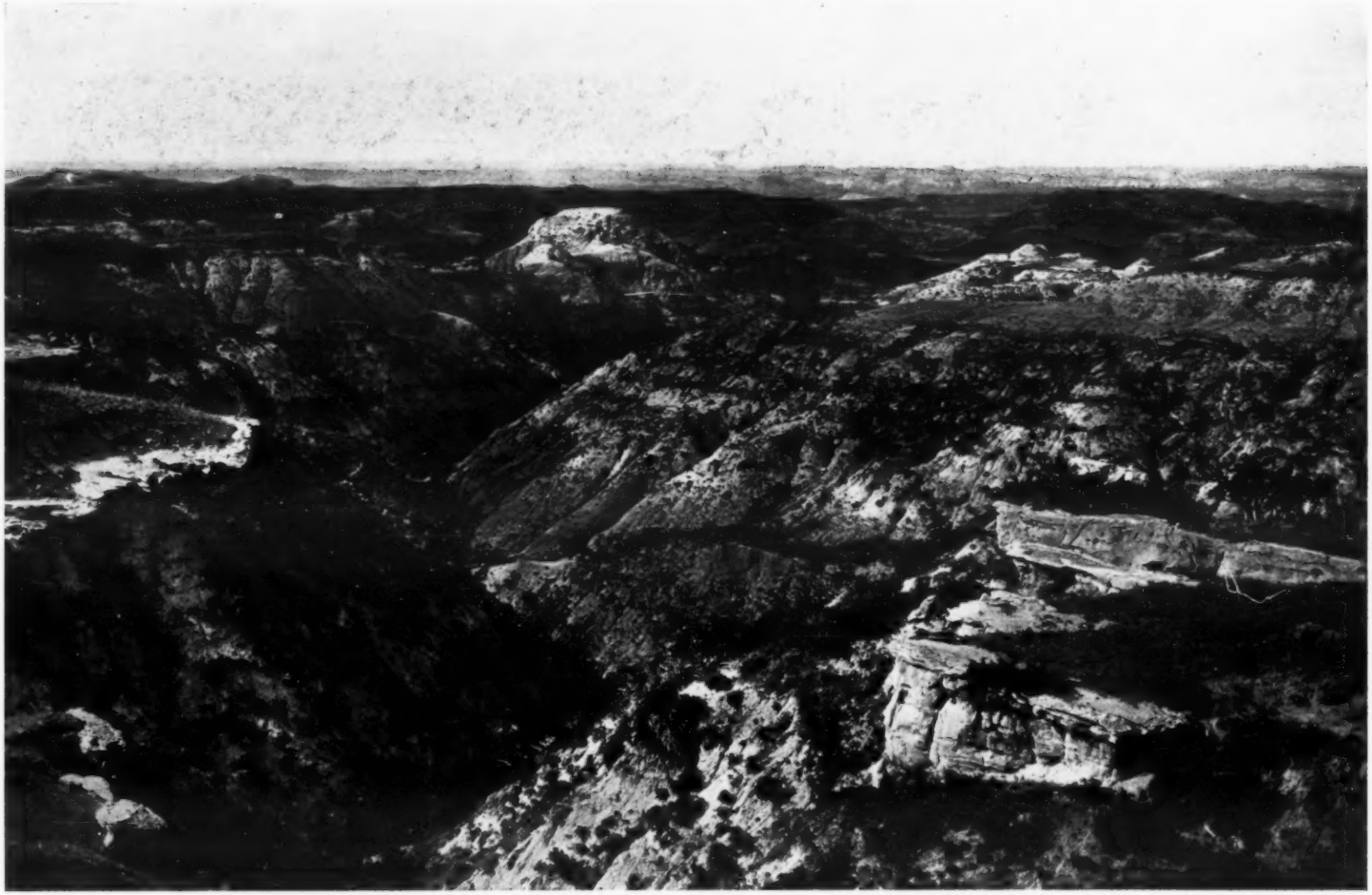


TYRANNOSAURUS QUARRY. HELL CREEK, MONTANA

Excavating with team and scraper, to remove a *Tyrannosaurus* skeleton lying in the position in which it had been interred and petrified millions of years ago

HAULING COLLECTION TO RAILROAD FROM CAMP AT MOUTH OF SAND CREEK, RED DEER RIVER

Museum Expedition of 1914



CRETACEOUS BAD LANDS LOOKING TOWARD THE MISSOURI

Almost impassible on horseback and very picturesque, a wilderness of variegated sculptured cliffs and domes intersected by deep cañons with scattered pine trees and pockets of junipers; while on the hillsides in the broader valleys, lines of cottonwoods mark the stream courses. The dullness of the denuded earth is relieved by bright-colored clay in bands traceable on the same level for miles

RED DEER RIVER, ALBERTA, CANADA. HERD CROSSING A FORD

American Museum Expedition of 1914

CAUSEWAY THROUGH SWAMPY FOREST NEAR MEDJE (ITURI DISTRICT)

Note the abundance of epiphytic plants on the trees. [For birds found in such a forest, see footnote on following page]

BIRDS OF THE CONGO

By James P. Chapin

Illustrations from photographs by Herbert Lang

THE Congo offers wonderful opportunity to the naturalist, and surely it will be difficult for one who from childhood has been a bird-lover to express the fascination of bird study in central Africa — to tell the charm of knowing the birds of a Congo forest almost as he knew those of the woods of his boyhood, recognizing them by their voices, finding their nests, investigating their ways of life, their food and enemies; and finally of cultivating this acquaintance for more than five years.[1]

In a country like tropical Africa, of course all serious study must be intimately correlated with collecting, for exact knowledge is otherwise impossible. The preparation and care of specimens, although apt to be more tedious in such a damp hot climate, are in principle much the same as at home; but it is the experiences in collecting, and the information one cannot fail to gather in the course of such work that prove of the highest value. Much of our success I believe was due to the endeavor to profit by this knowledge as well as to rely whenever possible on the assistance of natives.

Negro ornithology is interesting, although often far from exact. Names for birds are usually generic, as might be expected. Sometimes one term includes all the members of a family, although a common and conspicuous species, like the great blue plantain eater or the fish-eagle, has a name of its own. These names have originated frequently in the calls of the birds, as *nakurubu* (pigeon), *nambulukuku* (dove), *magiligili* (lapwing) and *buku* (wood-owl). Among the Medje, a green-backed cuckoo's plaintive whistled note is very well imitated in its name, *papunzisodu* [literally, "Father is dead, so there!"]. Others are named from their habits, as the tick-bird that clings to the bodies of buffalos and rhinos is known to the Azande as *zeregbe*, or buffalo-bird.

The birds of Africa are generally conceded to be inferior in song to those of Europe, yet there are some worthy of high praise. Best are the thrushes, three of which (of the genus *Cossypha*) are also expert mimics, often mocking eagles, hawks, fruit-pigeons and cuckoos from hiding places in dense second-growth. One of their small relatives, an extremely wary denizen of the virgin forest, has a song so sweet that my native helper christened it the "king of music." On the granite hills of the Sudan border and fond of the most inaccessible rocks there, is another first-rate songster (*Thamnolæa*) of the thrush family. The orioles of course have mellow whistles, as do also a few of the numerous

[1] For this unique opportunity I am indebted to the American Museum of Natural History, in whose Congo Expedition I have had the privilege to take part as scientific assistant to Mr. Herbert Lang, and I feel it my duty here to express my sincere admiration of Mr. Lang's efficient direction of the work and my heartfelt appreciation of his invaluable advice and encouragement throughout our long stay.

Footnote: — Most important among the characteristic birds of this equatorial forest are the crowned eagle (*Spizaëtus*), the black guinea fowl (*Phasidus*), wood rails (*Himantornis* and *Canirallus*), plaintain eaters (*Corythæola; Turacus*), gray parrots and hornbills, but in addition there are many smaller eagles and hawks, crested guinea fowls (*Guttera*), forest doves (*Calopelia*), fruit pigeons (*Vinago*), cuckoos, horned and wood owls, beautiful trogons, spine-tailed swifts, barbets, woodpeckers, starlings, black-headed orioles, bulbuls, thrushes and weaver birds.

Native climber at a hornbill's nest thirty-five feet from the ground. He has made the ascent by means of two stiff ropelike loops encircling the tree, one supporting his right thigh, the other the left foot

and varied shrikes. Even the emerald cuckoo utters pleasant whistled notes. This bird is known among Europeans as the most beautiful of Congo birds, although a lover of tall trees, where the jewel-like green of its back and head can hardly be admired. On the other hand, none of the larks we met with had anything worthy to be called music, indeed one of them simply beats its wings loudly at intervals (whence its name "clapper-lark") while making long flights high in the air.

Congo birds are not lacking in brilliant and striking plumage. The flower-loving sunbirds, somewhat larger than hummers, have gorgeous metallic purple, violet and green hues, often with red and yellow beneath, and sometimes with two long feathers in the tail. Paradise flycatchers have the two middle feathers of the tail much elongated, and white. Kingfishers, with their glossy blues and greens range in size from one of the largest species in the world down to little red-billed fellows no bigger than warblers, feeding on insects, but digging their burrows in the characteristic way. Several of the plantain-eaters, large, dark green and violet, surprise one when they take flight with extensive crimson patches in the wings. Among the many other brightly colored forms are the soft-feathered trogons, the graceful bee-eaters and rollers, glossy starlings, golden orioles,

Head of hornbill (*Orthologhus cassini*), owner of nest shown above

VIEW IN THE CONGO FOREST

Here tree ferns grow and there is no danger of forest fires, for everything is saturated with moisture. The woodpeckers of this region are all rather small, in spite of the great trees and abundant insect life. Not a few feed principally on ants. One of the smallest, known as a "piculet" has soft tail-feathers and is only three inches long. Some of the weaver birds are insectivorous and two species climb about the bark of trees like nuthatches

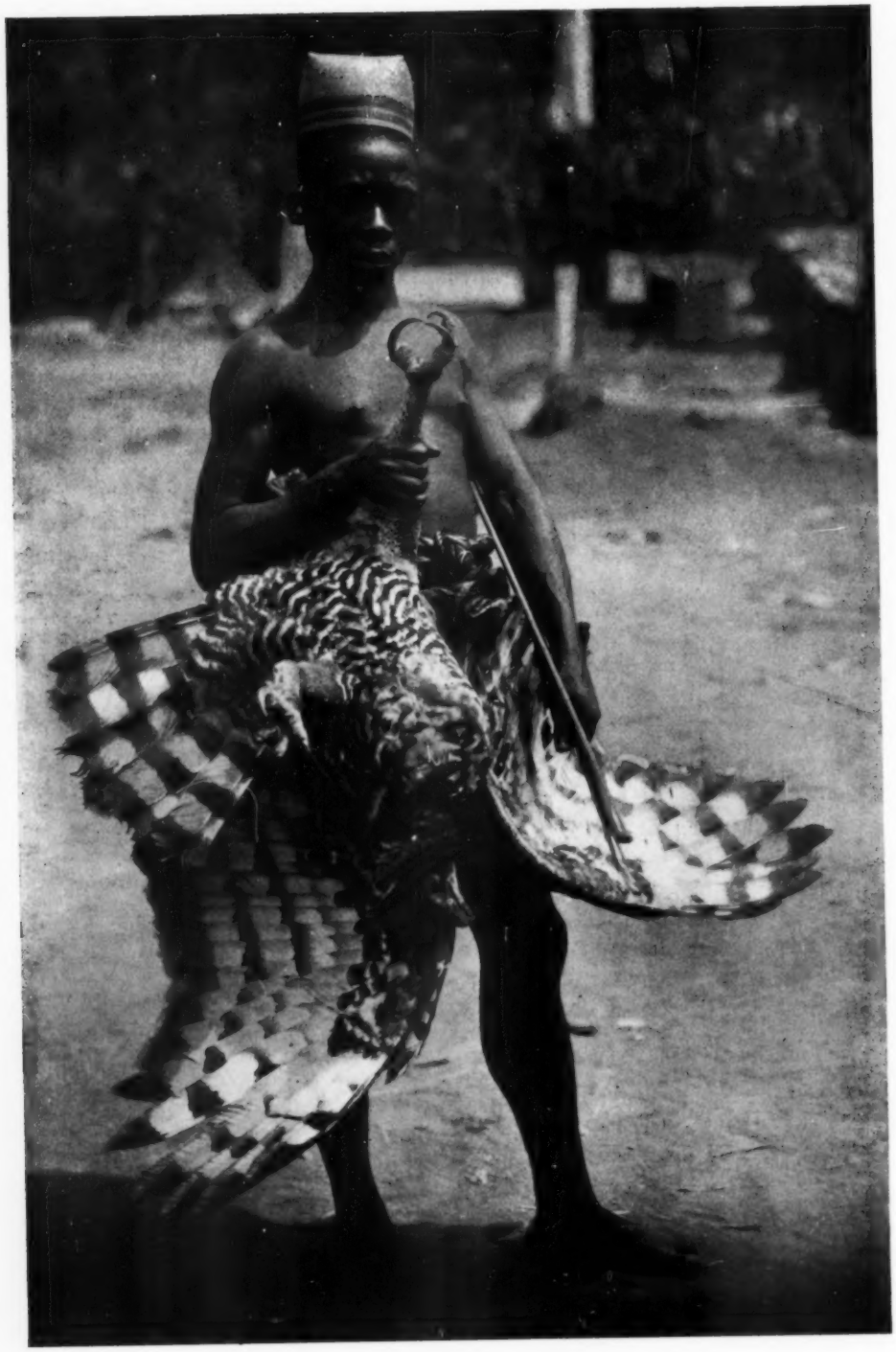
In these forests it is a common thing for the smaller insectivorous birds of many different species to gather in parties, all moving in the same direction as they search for food. Some of the "babblers" (family Timeliidae) and true thrushes recall the "ant-thrushes" of South America by their dull colors and terrestrial habits. A few of them are in fact attracted by the moving columns of driver ants

A RIVER FERRY IN THE FOREST

Small native dugout crossing the Nava River about four miles west of the post of Medje. Such streams are the haunts of white-crested bitterns (*Tigriornis*), rufous ducks (*Pteronetta*), small rufous-headed rails (*Sarothrura*), sun grebes (*Podica*), fish owls (*Scotopelia*) and small brilliant kingfishers (*Alcedo*)

THE ROAD BETWEEN DUNGU AND FARADJE

The dry season in grass and bush country (Uele District). During the rainy months (May to November) the coarse grass grows until it stands higher than a man's head but is later burned off by the natives. The fauna is strikingly different from that of the forest, including as most important perhaps among birds the marabous, vultures and kites, the colies or mouse birds, widow-birds, and pennant-winged nightjars, besides many of less importance such as francolins, typical guinea fowl (*Numida*), quail, bustards, turtle doves, blue rollers, bee eaters, the ground-hornbill (*Bucorvus*), hoopoes, larks, shrikes and bishop-birds



MAKERE NATIVE WITH GREAT-CROWNED EAGLE

azure cuckoo-shrikes and flaming bishop-birds.

The Congo furnishes some examples of birds of most remarkable instincts. The honey guide fully merits its fame for attracting men with its chattering cry and leading them to beehives in order that it may share in the spoils. A bird of the more open grass country, it greets you with an insistent "cutta-cutta-cutta-cutta!", flies off ahead, and if you have time to follow it, will take you to the hive it knows of, although you will then have to watch and listen yourself for the bees, while your informant sits quietly watching in some nearby tree. Honey guides eat a good deal of beeswax; in preparing the specimens we usually found some in their stomachs, even in those of some of the smaller related species that do not call upon man for assistance.

The pennant-winged nightjar (*Macrodipteryx vexillarius*) hunts at night in the open grass country. It assembles in flocks when the winged termites are leaving their nests at dusk

The nesting habits of hornbills, of which we secured no fewer than ten different species, are especially curious. The eggs are laid in a hole in a tree, where the female is confined until her young are fully ready to leave, perhaps some six weeks. The entrance is partially closed with muddy material, and food is brought to her regularly by her mate; in fact the nests were discovered by watching his movements. Natives stated that the female sheds all her quills from both wings and tail, during this period, and we found that in some cases at least this was true.

The collector in the Congo has often great difficulty in approaching birds, especially in the great trees of the Ituri forest, where a bird on the upper branches may be one hundred and twenty feet above anyone standing beneath the tree. Yet certain species were seldom seen elsewhere, just as certain others skulked continually in dense underbrush. Since my return I have been struck by the comparative tameness of many American birds, and have wondered to what to ascribe it. Can it be that the abundance of mankind, instead of making them wary, actually causes them to become indifferent, or

A living "scarecrow" watching over a field of ripening grain (sorghum) to scare away the weaver birds. He shouts and throws pebbles or shoots little reeds from his bow, while women and children walk about among the grain to help protect the harvest

Coly, also called "mouse bird" from its habit of creeping about among the branches. The tail-feathers are molted so gradually, and are so often broken that an individual with a complete tail is rare. The foot is peculiar in that all four toes can be turned forward at once

are the fears of African birds kept sharpened by their other more numerous enemies, rapacious mammals, birds and reptiles? Many small Congo birds take wing at thirty yards or more; although in strong contrast to this, one bird, the common black-and-white wagtail is so confiding that it nests in the thatched roofs, and walks about on the verandas, coming up to within six feet sometimes if one sits very quiet.

Others are not only shy but also very clever at hiding away in dense vegetation, their voices alone betraying them. I remember particularly some small brown warblers (*Bradypterus*) in the papyrus, whose prolonged chirping notes and loud wing-beats induced me to spend hours and hours breaking pathways into the swamps, often knee-deep or more in mud and water, and then waiting motionless, until at last, after

Wild date palms in a papyrus swamp, bearing large numbers of nests of a large yellow-and-black weaver bird (*Hyphantornis cucullatus*). Many weavers are fond of nesting on boughs overhanging rivers, also on thorny trees or vines, and a few species build in the tree where an eagle, buzzard or marabou is nesting, also evidently for protection

days of such work, I was able to see and collect a few of them.

Still others, such as swifts, some birds of prey, hemipodes, quail, partridges, and snipe had to be shot on the wing. At this I was at that time far from expert, but even my moderate success never failed to surprise native witnesses. They would grin, and then cover their mouths with the hand, later to deliver speeches on the strong arm or sharp eye of the white man. They themselves never think of shooting an arrow at a flying bird, and the few of them who possess old muzzle-loading guns would not risk powder or caps on such a hazard, so they have little idea how it is done.

Hadadah ibis, typical of forested river-banks

Among the water birds the elusive finfoot or sun-grebe (*Podica*) caused me a good deal of trouble. Traveling along the Ituri River in native dugouts we would occasionally come upon them, usually singly, swimming close to the shore. One bird to four days' journey was about the average frequency. The long stiff tail lies on the water and the back is so nearly immersed that little can be seen except the head and the neck. On sighting us, the finfoot would either make straight for shore or fly ahead some distance, dropping into the water, to swim ashore and hide in the bushes. From this concealment it was sometimes impossible even for several boatmen working together to drive it out again, although with luck it would return to the water, scuttling off with a noisy patter of feet like a coot. Balancing oneself upright on the bow of a small canoe in such pursuits as these is often a ticklish performance.

Nightjars, owls, and other nocturnal birds with their mysterious habits tempt one to evening strolls. Two species of the nightjars (*Macrodipteryx*) have a

very long feather in the wing, and in one of these species the feather has a bare shaft and racquet-like tip, so that in flight at dusk the bird looks as though pursued by two smaller ones, hovering continually a little above and behind.

In the posts of the Uele, on moonlight nights in the dry season the large-eyed stone curlews (*Œdicnemus*) walk about on the ground uttering at intervals a series of shrill whistles. These calls puzzled us at first, for the streaked brown plumage of the birds made them difficult to see, and they spent the day in quiet spots along the rivers, coming to the stations to feed only at night. We used to watch at twilight for a chocolate-black hawk (*Machærhamphus*) that seldom flies by daylight, but subsists largely on small bats, flying rapidly about in the growing darkness, swift as a falcon. This peculiar hawk although rare in collections, ranges widely over Africa, and we observed it all across the Belgian Congo.

Immature specimen of crown eagle (*Spizaëtus coronatus*)

The natives often secured good specimens, sometimes with their arrows, and brought them to us, to secure in exchange some coveted gilt tacks, tablets of salt, or other small objects they considered valuable. They procured us even the great crowned eagle (*Spizaëtus coronatus*), a forest species preying on monkeys. This bird makes an enormous nest — under one of which I once spent the better part of three days waiting for the bird, pestered by tiny ticks and honeybees. Some of the natives used birdlime made by boiling a rubber-like sap together with palm oil, a method however which we always discouraged.

But it was by trapping that they aided us most effectively. There were many birds in the forest, living on and near the ground that were exceedingly difficult to see, and some of these we were hardly able to get save through this coöperation. The Medje and Mangbetu tribes make a very good trap. A young tree is trimmed and its stem bent over to serve as a spring; attached to this is a slipknot, which is jerked taut when anything touches a horizontal stick in the middle of the noose. These traps are set in the game paths in the forest or in cultivated fields, and baited with

termites, sometimes broken pieces of the hard clay nests containing these insects but preferably with the large, fat, winged termites themselves so beloved by birds. Such a trap is very effective, catching francolins, guinea fowl, large wood-rails, pigeons, and a great variety of smaller birds. Ants of course, were unfortunately so numerous and industrious that specimens left too long in the traps were sure to be mutilated — and many a time too, I have had to berate well-meaning men who brought us the birds but kept all the quills which they had pulled out from wings and tail to decorate their hats.

Sometimes simple loops of thin cord would suffice to snare birds, especially near their nests. The Logo trapped the large bustard by constructing a rude fence in places where the grass had been freshly burned, with openings at intervals where loops of cord awaited the neck of a victim. I have seen men of the same tribe capture waxbills in rude cages built on the ground, with a little grain as bait.

The most curious way of catching birds however, that I ever witnessed was at a small cave, large enough to hold two or three men, in a steep bank of a wooded ravine. Here a man would sit inside, having fastened a piece of calico like a curtain above the small entrance, and wait for the colies, or mouse-birds, which came in numbers to eat the earth in this recess. When a number of birds had entered he would suddenly pull down the cloth, cutting off their escape, and catch them in his hands. I have known thirty to be caught in this way within a few hours.

Some small red-headed rails that we found very difficult to flush, we could often catch in the hand — as the Mabudu taught us — after we had surrounded them by a circle of a dozen or more natives or even children. In the same fashion we once caught a crake, almost as large as a clapper-rail.

I knew a man of the Ababua tribe, who was able to call forest guinea-fowl (*Guttera*), and have seen him bring up a whole flock to within a few paces by imitating their nasal calls. He was a corporal in the native police force and a very useful man to his European officer, for besides these guinea-fowl he could call also the small antelopes of the forest — with a loud sound like "n-n-n-y-au!" made with fingers pressed to the nose — providing the means of many a welcome change in the menu.

With regard to the migration of birds, we enjoyed unusual opportunities for observations extending over several years. Not only are there many that come from Europe to spend their winter in central Africa — for example, the nightingale, swallows, warblers, falcons, storks, snipe and other water birds, but also a number of African forms that do migrate to a certain extent, including certain of the lapwings, storks, bustards, hawks, kites, nightjars and weavers. The bird collection made by the expedition is remarkably rich, not only in the number of specimens, but particularly with regard to the variety of different species, which number close to six hundred, many of them as yet very rare in museums, and some still unknown.

Our long stay in the Congo, with its trying climate, would have been impossible without the many privileges and favors bestowed upon us by the Belgian Government, whose amiable representatives always welcomed us in the most cordial manner and assisted us in every way, contributing very much to the success of our work and winning our deepest admiration and gratitude.

REPRODUCTIONS OF AFRICAN PHOTOGRAPHS FROM THE WORK OF HERBERT LANG AND CARL E. AKELEY

Photo by Herbert Lang

THE WHIRLING DANCE OF THE ABARAMBO

This dance is performed only by men. Note the man at the right jumping high in air.
Near Poko, in the Uele District of the Belgian Congo

Photo by Herbert Lang

IN THE VILLAGE OF A BANGBA CHIEF

Part of the great circle of huts for the chief's wives. The wall of the hut is of clay; the conical grass roof rests on this wall without other supports. Tasteful geometric designs are painted in red, white, and black on the clay walls. Near Rungu, Uele District, Belgian Congo

Photo by Herbert Lang

MANGBETU ARCHERS IN SHAM BATTLE, UELE DISTRICT

The Congo is policed by soldiers recruited from native tribes. The troops are commanded by European officers, Belgian, Swiss, and Scandinavian, are drilled with French words of command, and armed with an old-model military rifle, the single-shot Albini. They have proved themselves of immense service in maintaining order and preventing intertribal warfare. At the opening of the present war the Germans in German East Africa with such black troops attacked the Belgian Congo, which was able to defend itself successfully with the native soldiery

Photo by Herbert Lang

CARVED IVORY HORN FOR CEREMONIAL AND DANCE

The head of the human figure at the end of the horn shows the characteristic female headdress of the Mangbetu (Uele District, Belgian Congo). This particular specimen is in the collection which Messrs. Lang and Chapin brought back to the American Museum from their six years' work in the Congo

Photo by Herbert Lang

BAFUKA, AN AVUNGURA-AZANDE CHIEF

At the head of his Azande warriors (Uele District, Belgian Congo), he helped Commandant Chaltin drive the Dervishes out of the Congo in 1897. His shield is of rattan; his garment is of bark cloth. Spear and shield are going out of use in the Congo both for war and the hunt because of the importation of guns. The flintlock is the only gun allowed to be sold to natives, although a limited number of percussion-cap guns are granted to chiefs

Photo by Herbert Lang

CHILDREN OF A CHIEF DANCING

Near Aba, in the northeastern corner of the Belgian Congo

Photo by Carl E. Akeley

NATIVE FAMILY AT HOME IN THE JUNGLE

The natives on the eastern slope of Mount Elgon (British East Africa) are seldom seen by white men. This family fled on the approach of the Akeley caravan, abandoning a young babe in the haste of flight. They were brought back and the man proved a valuable guide

Photo by Carl E. Akeley

MILITARY ROAD IN UGANDA

Along this road, shut in between high walls of green except where the elevation gave an extended view, the Akeley expedition carried elephant skins out from the wilderness camp

ON UASIN GISHU PLATEAU, BRITISH EAST AFRICA

Photo by Carl E. Akeley

Colonel Roosevelt on an elephant hunt with Carl E. Akeley discovers a hyena naturally trapped in the carcass of an elephant

Photo by Herbert Lang

IN THE KING'S KITCHEN

Women grinding flour for making beer from *Eleusine*, a small millet-like grain which has been sprouted and dried in the sun. Village of Okondo, near Niangara, Uele District, Belgian Congo

Photo by Carl E. Akeley

SCENE ON THE TANA RIVER

This river is the main drainage of the Mount Kenya region, British East Africa

Photo by Carl E. Akeley

FOREST SCENE ON MOUNT KENYA BELOW THE BAMBOO BELT

THE TRAIL OF WAR IN MACEDONIA

By David Starr Jordan

NOTE.— The following interesting and significant statement is quoted from Dr. Jordan's letter to the Editor, who had suggested at some time previous that an article on the effect of the war on science would be interesting to readers of the JOURNAL: " . . . . I am sorry my sketch does not more nearly meet your needs. However there are certainly elements of science in a study of the unscientific ways of the men of the Balkans. . . . The effect of the war on scientific endeavor in Europe can be stated in few words. It has been to blast it — excepting only in the lines in which science has been prostituted to murder, and in the lines in which men try to save life, even if only to destroy it when saved. Half the young scientific men are in the ranks and many have been killed or wounded. A few scientific papers are printed, mostly written before the war, but science cannot thrive in an atmosphere of lawless hate. The end of the war will come — before long, I hope and believe — but the center of gravity in scientific work will have shifted to America. Europe will be supine."

IT was my fortune, not long ago, with three good friends [1] and two soldiers, to follow in a King's automobile along the trail of war. This was in Macedonia. The line of an army's march is not pleasant to look upon even though the people along it had not much to lose. The pinch of suffering is very real even if, as in the Balkans, folks have grown used to it. There are two plain marks by which you may recognize the path of war in a land of farmers. The one is the charred village, with its white-washed stone walls blackened by fire. The other is the presence here and there in the ploughed field of three poles fastened together at the top, and from the crotch a baby suspended just high enough to baffle inquisitive dogs or goats. Somewhere in the field, anywhere in the Balkan valleys in May, you will see one woman driving or leading a bullock or a buffalo, while another behind her holds the plough. The men are in the army — or else they were there.

Photo by Antonio Reinwein

Characteristic scene on the hills above Rjeka near Cettinje, Montenegro

The memory I shall longest hold of Montenegro is a picture taken by my guide, Antonio Reinwein, of this land of stony graves, of the resolute people of the limestone crags who have never done homage to the Turks nor to any other outside power.

It will be remembered that all these Balkan folk were for years under the dominion of the Turk, and that none of them have been free for half a century. The Turk was most acceptable when he was asleep. When he was awake, he had his own ideas of "Union and Progress." Union meant uniformity. A nation should have one ruler, one flag, one religion, one language. Progress was his way of bringing about this condition. This was by massacre. And as the actual Turks were few in

[1] Dr. John Mez, R. H. Markham and Emil F. Hollmann.

number, ruling over an empire of Slavs, Greeks, Italians, Jews, Armenians, Albanians, Kurds, Egyptians, Moors and Arabs, it demanded eternal vigilance to keep them all in a state of union and progress.

These people have had constantly before them the choice of revolt, conversion, assimilation, banishment and massacre. And at one time or another, some of each race have chosen each one of these, often two or three of them at once. Meanwhile, following the wicked lead of Bismarck and Disraeli, Europe has kept the Turk alive, because from financiers in each nation, the Ottoman Sultan has borrowed considerable sums of money. If the "Sick Man of Europe" should die, his debts might be left unpaid; worse than that, they might be unsecured. And so the Balkans were kept in confusion and the rest of the Ottoman Empire as well, in the hands of wild soldiers. Besides there were still wilder hordes of local *andartes*, *comitiji*, ruffians, camp-followers, or *bashi-bazouks*, always ready for murder and plunder. Whenever a period of peace and tolerance set in, as was sometimes the case, it was due to sheer inanition on the part of the Turk and as such it was followed by a fierce relapse. One by one the Balkan states, in different fashion escaped from Turkish rule. First Greece and Serbia, Rumania and Bulgaria; then Rumelia, to become part of Bulgaria; Bosnia and Herzegovina to be absorbed by Austria, and in the war of 1912, Macedonia with Thessaly and Thrace, to be unequally divided among their neighbors, and finally Albania to be segregated as an impossible kingdom under an impossible king.

Macedonia lies along the southern slopes of the Balkan Peninsula. It is a fertile region crossed by chains of rounded mountains, with green valleys and swift streams, in physical conditions not unlike the south of France. It has 45,000 square miles of territory, is about as large as the state of Maine, with a population nearly two-thirds that of the city of New York, and before the war of liberation it had about 2,250,000 people. The majority of these were Bulgarian in blood and they were allowed to have their own churches and schools. Some called Pomaks had adopted the Moslem religion, others were Greeks in language as well as in religion. These were in the west (Castoria) adjoining the land called Thessaly. But Greek or Bulgarian, they were nearly all of the same blood originally, for the modern Greek is not the son of the incomparable Hellenes, but is described as a "Byzantinized Slav." The suicidal wars of Athens and Sparta, with the greater and lesser struggles which history describes, exterminated the choice blood of Hellas and when the Greeks were gone, with them went "the glory that was Greece." Turks, Jews, Armenians, Rumanians (Valaques) and gypsies made up the population of Macedonia. The Jews in Saloniki were refugees from Spain, still speaking a dialect of Castilian. In the face of "democratic famine working day and night," fully half of these have now found their way to New York.

As to the campaigns which have desolated Macedonia in the last few years we need say only a word. The history of the two Balkan wars is given with accuracy and justice in the monumental report of the Balkan Commission of the Carnegie Endowment, a document of especial value in any study of the conditions preceding the "third Balkan war" which to-day has set the world in flames.

The first Balkan war was altruistic as far as any war can be. Its purpose was

the relief of a distressed people, suffering for centuries from the laxities of Turkish rule, always incompetent and everywhere unscrupulous, and on the other hand continuously overrun by the outlaw patriots which kept the land in incessant turmoil.

The Balkan alliance was a Russian inspiration. It was planned by Hartwig, Russian minister at Belgrade, "the

A burned Macedonian village

Greek refugees at Saloniki (from Thrace)

Evil Genius of the Balkans." It ended in the Treaty of London, where the blind intermeddling of the Powers, baffled by Austrian intrigue, agreed only on the kingdom of Albania, leaving the states to fight it out so far as Macedonia was concerned. This brought on the second Balkan war, in which Bulgarian

Greek refugee camp at station of Demir-Hissar in Macedonia

Levenovo, in Macedonia, a burned village partly restored

diplomacy made all the mistakes it had a chance to make. For these she was duly punished by the brigand Treaty of Bucharest, in which Rumania forced into her own hands the fertile meadows of the Dobrudja, while the best of Macedonia was divided between Serbia and Greece.

If the Powers had not been a group of wrangling agents sparring for advantage, they would have considered the interests of Macedonia first. They would have made it an autonomous province held in trust for the welfare of its people and above all, with entire tolerance of religion, language and race. But no such tolerance yet exists in Europe outside of its westernmost nations.

The Treaty of Bucharest left Macedonia crossed by artificial boundaries. The effect of intolerance, worst in Greece, bad enough everywhere, was to drive out of each nation all who belonged to the wrong language or religion. I do not say race, for they are all of the same general stock, even the bulk of the "Turks" and Greeks. This has filled the region with refugees, men and women whose fault is that they lived on the wrong side of boundaries made for them in the Treaty of Bucharest.

Passing down the long highway which leads over two hundred miles from Sofia to Samokov and Dubnitza in old Bulgaria, then across the border of Macedonia, down the Struma River past Dzumaia to Petritch, we found everywhere the Bulgarian refugees from the Saloniki district in Greek Macedonia. These have been roughly estimated at 50,000 in number. Some of these have been given farms or houses abandoned in Macedonia by Turks who followed the Turkish army away. Others received farms left by Greeks when the Greek army went back after the treaty of Bucharest. The government grants each person some fourpence a day. Some find work, but after the war there are few employers. The cost of living has doubled, the means of living has fallen. At Petritch, near the present boundary of Greece, there were hundreds of these waiting about on the stone sidewalks day by day. They were waiting for the Powers to revise the Treaty of Bucharest and give them back their homes in the region above Saloniki. Some local journal had said that this revision was coming soon. It was my duty to assure them that it would never come. The phrase in Sofia, "Europe exists no more," is the truth so far as Balkan affairs are concerned.

The reason for that is clearer now. Europe was paralyzed by the great terror which has since come on it in an unthinkable catastrophe. There were some in the "Concert of the Powers," who were striving to bring on this catastrophe. The "war of steel and gold" was about to give place to real war, which would end, they hoped, in speedy victory and world power. It has not ended in that way. It has not yet ended at all. But those who most looked forward to war were the ones who had least conception of its certain consequences.

The condition of the Bulgarian refugees has been especially hard because their flight took place mostly in the fall and winter and before the cholera was stamped out. Very many died on the road, and many more died after reaching the inhospitable Bulgarian towns, where they received scanty welcome because the people were overborne by their own troubles.

The Rumanian invasion caused also great hardship in Bulgaria. The annexation of Silistria and the Dobrudja, with its population of about 180,000, was

Greek army stationed on Bizbutza River boundary between Bulgaria and Greek Macedonia. Third from the left, General Evangelos Tsanas; fifth, Themistocles Papajeaines; seventh, beside Dr. Jordan, John Pappamelins

En route Saloniki to Constantinople — Moslem and Turkish refugees in steerage

followed by the exodus of all those unwilling to be summarily Rumanised in language and in religion. These refugees swarm in Varna and Plevna, while it is said that at Burgas, near the Turkish frontier, there are now 43,000 more forced out of Turkish Thrace since the recapture of Adrianople by the Turks with the wiping out of the Enos-Midia boundary line so carefully drawn by the Concert of Powers.

In the whole length of the Struma Valley in western Macedonia, towns have been burned in whole or part by the Greek army which pursued the Bulgarians as far as the old border of Bulgaria. In Greek Macedonia, at the hands of some one or all of the three successive armies — Turkish, Bulgarian and Greek — most of the towns between Saloniki and Drama have suffered the same fate. Each of these towns has now its share of Greek refugees from Turkish Thrace. These have been estimated by Greek authorities as numbering 300,000. They have come by railway from Adrianople in box cars belonging to the Greek Government. These cars are left at the various stations, a dozen or more at each. In these the people keep their bedding and their scanty effects. The government of Greece allows them two or three sous a day, with rice which they cook on fires of thistles and other weeds. I was told by one of these at Demir-Hissar that their homes about Adrianople and Kirk Kilisseh, were wanted for Albanian refugees from the Novibazar (now annexed to Serbia), and that they were given by the Albanians from two hours to four days to get out of Thrace. He summed up the conditions in the Italian word *duro* (hard). I was told also that a Turkish town near Nigrita (or possibly Nigrita itself) had been turned over bodily to Greek refugees, and that the rest of these would in time be placed on farms abandoned by Turks and Bulgarians. Other Greeks, not refugees, were coming from Russian ports, attracted by the prospect of free land in Macedonia.

In a Turkish journal, vigorous complaint was made against the Albanian refugees in Thrace as more "proficient with the Mäuser than with the plow, and skillful only as cattle thieves." A plea was made for bringing back the Bulgarian farmers as far more desirable neighbors. "The Bulgarians are now our friends."

In the larger towns, as Saloniki and Kilkush, the refugees are ranged in tent cities, ten thousand or more in one encampment. There were perhaps sixty thousand Greek refugees a little more than a year ago along the road from Drama to Saloniki.

A little more than a year ago, when I was at Saloniki, the Turks were leaving in great numbers: 212,000 took steerage passage for Stamboul in April. Saloniki, (Thessalonike) beautifully situated, in full face of Mount Olympus and with a noble harbor should be one of the great cities of the world. In the aftermath of the second Balkan war it lost half its population. It is no better off to-day than in the times when St. Paul called out for help in Macedonia. A year ago, there were still many Turks in Saloniki, teamsters, laborers, idlers about the wharves, gentlemen smoking in the cafés. Even in Bulgarian towns, as Dzumaia, one may see the red fez, but its wearers seem to have nothing to do save to lie about in unoccupied lots or to sit upon the steps of burned buildings.

In Serbian Macedonia, the Bulgarian is turned by force into a Serbian. If he resists, he risks his life. His name is changed, as from Popoff to Popovitch, from Stephanoff to Stephanovitch. His

religion, Greek in either case, transfers its allegiance from the heretic exarch in Sofia, to the orthodox patriarch in Athens. The theory is that Bulgarians in Macedonia are really Serbians perverted by their environment.

These harsh and often terribly brutal operations in Serbia and Greece result from the unchecked operations of the military element. The soldier, as such, considers neither economic conditions nor the soul of man. It was claimed that the two wise ministers Pashitch in Belgrade and Venizelos in Athens were both opposed to the policy of repression. Both would, if they could, have proclaimed religious linguistic tolerance in those parts of Macedonia turned over to them by the Treaty of Bucharest. But the fact of victory, and especially victory over their sister state, Bulgaria, intoxicates the military, and fills the mob with the "east wind." In such times the civil authority cannot hold its own against the military.

Bulgaria, being on the defeated side, recognizes better the value of tolerance. A Greek church and school stand undisturbed in Sofia. In the Bulgarian national assembly there are about a dozen Turkish deputies, representing Thrace. These Turks, supporters all of the King, hold the balance of power against the combined Democrats and Socialists, the group opposed to all war. The spirit of hate is still very strong among the people of Bulgaria. They hate Rumania, as the robber-state who has done them the most harm. They hate Greece and Serbia, but they cannot fight them, and the broad-minded among them recognize that when Bulgaria is strong enough to fight, she will be able to carry her points in some better way than by war.

In the crisis of the early part of 1915, the upper classes of Bulgaria were strongly on the side of Germany. They hate Russia, believing (perhaps on insufficient evidence, for the Russian government had given them fair warning) that Russia had betrayed and abandoned them in the Treaty of London.

The common people do not want any more war, and they have a very high respect for England. Bulgaria has 250,000 soldiers, but very little in the way of arms. She is not sure what her army would do if it were called together. She does not care much for the rest of the world, but her heart is fixed on Macedonia and Dobrudja, for these were mainly Bulgarian, before the Bulgarian people were driven away. The public in Bulgaria expects the nation to go into the war somewhere. If it does so, it will fight for the group that promises the return of the lost provinces. Demands for war and for neutrality fluctuate with each movement of the Russian troops in the Carpathians. Meanwhile, the old days have come back to Macedonia. Outlaw bands of discouraged farmers harass the Serbians and the Greeks as formerly they harassed the Turks, from Monastir to Kavala. And the farmer still goes out furtively from his half-burned village to gather in his crops as he can or he dares.

There can never be settled quiet in the near East, until the "Balkans belong to the Balkans," until civil authority everywhere dominates the military and until customs unions and other unions cause these people to realize that one fate befalls them all and that the welfare of each state is bound up in that of its neighbor.

A pair of courting birds standing on a shoal overlooking the sea

THE PENGUINS OF SOUTH GEORGIA

"JOHNNIES" AND "KINGS" ON A DESOLATE SUBANTARCTIC ISLAND[1]

By Robert Cushman Murphy

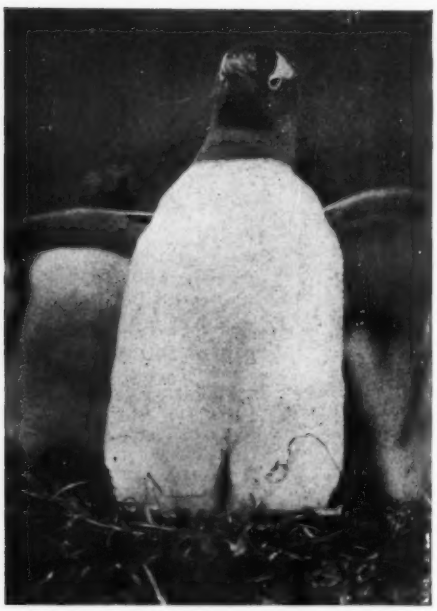
QUITE unlike the Johnny Penguin is its big neighbor, the king penguin. This species was once abundant at South Georgia, but it is now obviously in danger of extinction, partly because of the foraging raids of sealers and whalers, partly from the ravages of traders in penguin oil.

We discovered three king penguin colonies, all in the neighborhood of Johnny penguin rookeries, but all on low ground. The largest of these was situated south of the Bay of Isles among a barren waste of morainic stones. A great bank of unmelting névé bounded the settlement on the west, while a violent glacial torrent separated it from the sloping edge of a glacier on the east. In such a gulch, between walls of snow and ice, swept by southerly gales that descended through a rift in the mountains, a band of about three hundred and fifty king penguins made their home.

When we found the colony, on December 16, many of the kings were incubating eggs, while at the same time half a dozen young of the previous year, fully grown but with ragged patches of long down still attached to their contour feathers, were associating with free adult birds. The sitters stretched up to as great a height as possible at the approach of their first human visitors (at least during that season), and clung tenaciously to their eggs. After the members of our crew had gathered many eggs and had placed them in one spot on the ground, the robbed penguins approached the pile and slyly appropriated eggs to replace the lost ones. But not only did they attempt to take one egg — the proper complement — several tried to tuck *two* in the space

[1] Continued from the last issue of the JOURNAL. Illustrations from photographs by the Author.

A king penguin tucking its egg into the so-called "brood-pouch," which is merely the space between belly, feet and tail



A Johnny standing over its eggs and momentarily spreading its brood-pouch, or incubating surface

between belly, tail and feet. I was never able to discover in either sex of the king penguin anything resembling a "cavity," such as Weddell mentions.

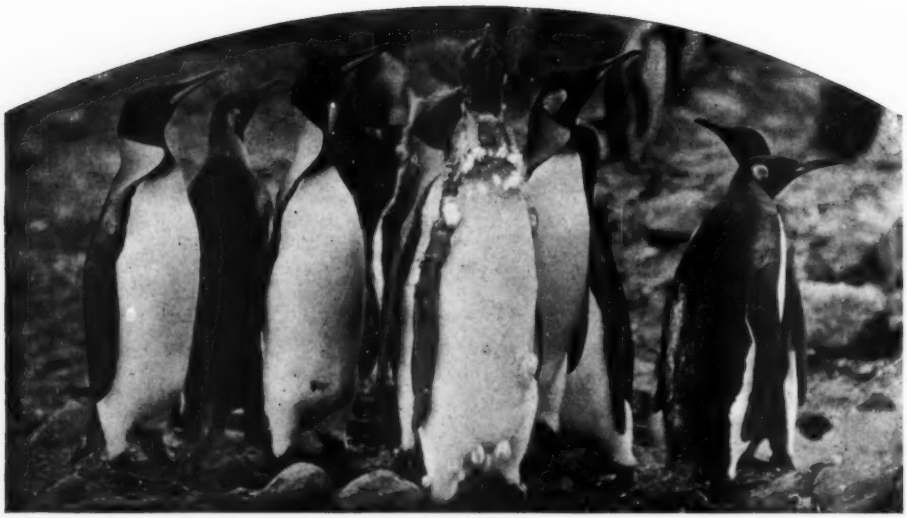
Incubating king penguins can shift about slowly, in spite of the eggs on their insteps. They drag themselves along rather painfully, maintaining their hunched positions, and hitching their feet with short steps so that the egg may not roll out. They are fond of crowding together closely — yet seemingly for no better purpose than to facilitate quarreling! Day after day at the colony I was a neutral witness of their noisy squabbles. The sitters glare at each other, with sinuous necks twisted and heads cocked sidewise, and deal resounding whacks with their flippers, or lunges with their sharp bills, to all their neighbors. Often whole groups will be engaged in an indiscriminate skirmish with these rapiers and broadswords. The birds are careful to maintain their equilibrium while banging each other, but it is a wonder nevertheless, that no harm comes to the eggs. On February 5 I photographed a typical battle. One sitter was employing its bill to mutilate the back of another's neck. The latter bird, grunting vehemently, was delivering backhand blows with one wing but without turning to face its opponent. Only the intrusion of weapons of other pugnacious penguins succeeded in diverting the attentions of these two from each other. The affair ended in a general mêlée in which nine birds took part, each for itself and against every other. Such is the reach and flexibility of the king's extensible neck that each sitter can very easily become the center of a large circle of trouble.

It seems probable that the breeding season of this species extends through the major part of the southern summer, with great individual variation in the

IN THE WATERS OF SOUTH GEORGIA

A Johnny penguin swimming under water and rolling his back above the surface

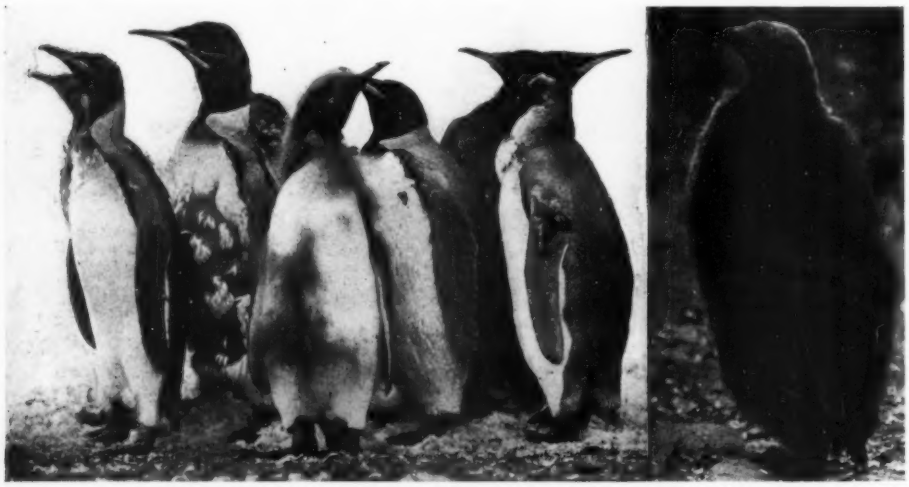
A king penguin entering the sea, and a king [the third photograph] coming ashore



The king penguins on the left are in sleek new plumage. The central figure is completing its molt

time of laying. I saw a few birds still engaged in pairing about the end of January. Courting couples stroll apart from the main flocks, and seem fond of standing side by side on high places such as knolls overlooking the sea. Caresses are then exchanged, the usual form being for the birds to cross their necks, swaying from side to side.

King penguins commonly deport themselves in an amusingly lofty manner toward human beings, paying slight attention to a man's quiet intrusion into their midst. If they are annoyed they march away, slowly and with an air of indifference, until they have been actually frightened by abuse when they fall upon their breasts and scurry on all fours. I have seen a fox terrier put a whole band of kings to ignominious



At the right — a yearling king penguin with his coat of down at its maximum length
Main group — a yearling king molting into his first adult clothes, and a group of old birds in the throes of the annual molt

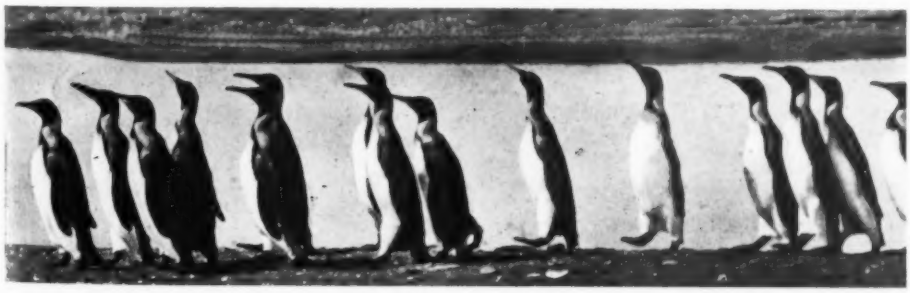
flight. Sitting birds alone are stolid and fearless, refusing to be stampeded even after their eggs have been taken.

The voice of an adult king penguin is a martial sound, a long-drawn bugle call, highly musical and almost worthy of being dubbed a tune. When delivering the call the bird stretches grandly to its full height, points its bill skyward, and the long volley rings forth from an expanded chest. At the close of the effort the head is tilted forward with a jerk and the bugler stands at attention — a rigid, artificial pose always held for several moments. The yearling penguin's call is a clear whistle of three notes, as soft and sweet as the whistle of an oscine bird.

The actions of "bachelor troops," that is birds of both sexes which are neither molting nor incubating, furnish continual entertainment to an observer. Such bands frequently come out of the sea during the warmer parts of the day to sun themselves on the beaches. The birds sleep either prone or upright; if in the latter position, often with the bill turned behind the wing where ages ago the ancestors of penguins may have had warm coverts. They preen themselves scrupulously and even perform the difficult stunt of balancing on one foot while they scratch their heads with the other. Their regimental characteristics, such as standing at attention, marking time, and marching in single file or in doubles, are very striking.

As regards enemies, I judge that this species is little troubled by the skua gull, the scourge of the Johnny penguin rookeries. Its enemy in the ocean is the sea-leopard. From the stomach of one of these seals killed at the Bay of Isles, I took the remains of four king penguins, besides fish and other material. The magnitude of this breakfast may be more fully appreciated if I record that the weight of a mature king penguin in good condition averages forty-four pounds.

Since South Georgia has been made a political dependency of the Falklands, the resident birds have come under the protection of law, but perhaps too late to save the king penguins because of the impracticability of enforcing legal restraint along hundreds of miles of isolated uninhabited coast.



Mimicking small brothers! I broke the spell by stooping to pat one on the head, when they all wiggled their tails and hurried back into the pond

ANTIQUE GOLD FROM COSTA RICA

Many specimens in Mr. Minor C. Keith's remarkable collection of ancient gold art from Costa Rica, represent gods in human, animal and bird form elaborated with the heads of crocodiles. The collection is now on exhibition in the Mexican hall of the American Museum

ANCIENT GOLD ART IN THE NEW WORLD

By Herbert J. Spinden

THE Isthmus of Panama includes part of Colombia and the entire republics of Panama and Costa Rica. It has long been famous for the beautiful specimens of gold work, as well as of pottery and stone sculptures found in the stone-box graves of its early inhabitants. Most of the gold objects were seemingly worn as ornaments before being buried with their owners. In these gold objects the characteristic animal life of the region is represented and there are also many figures with a mythological or religious significance.

Gold is taken from only a small percentage of the graves — probably from those of chiefs. Pottery and stone carvings are found in the ordinary run of burials but rarely in the ones that contain gold. A systematic rifling of the ancient cemeteries by treasure-hunters has been going on since the coming of the Spaniards but most of their finds have gone into the melting pot. The burial places are sometimes made evident by low platforms built over a number of graves. Sometimes the searchers use an iron rod giving forth a hollow sound when the stone cists are struck. The graves are small chambers lined with river boulders or with slabs of stone. Bones are rarely found in them but this may be no indication of great age, for the climate is such as to hasten decay. There is little doubt that the makers of the gold figures were simply the ancestors of the Indian tribes that now inhabit the region. Costa Rica takes its name "rich coast" from the large quantity of gold obtained from the natives.

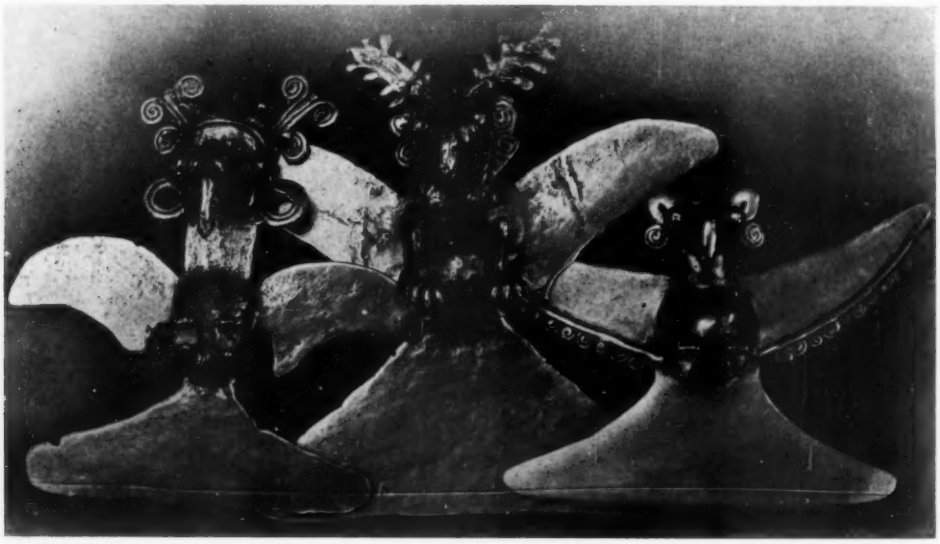
Mr. Keith's collection, now on deposit in the Mexican hall for a term of years, is the finest ever made in Central America. At Mercedes in northern Costa Rica many hundreds of graves were opened and a vast amount of pottery and stone sculptures was taken out, in addition to a considerable quantity of gold and jade. At this place there is now a great banana plantation but formerly the site was covered with dense forest. Mr. Keith relates that one night

NOTE BY THE AUTHOR.— The ancient gold here described is part of a collection of more than 15,000 archæological articles in gold, stone and pottery collected by Mr. Minor C. Keith in Costa Rica. From this great collection about 7000 specimens chosen for exhibition and study, were deposited by Mr. Keith in the American Museum for an extended period. The exhibition now occupies about one-third of the Mexican hall and is unrivaled in beauty and richness as in more prosaic scientific virtues. The gold specimens are installed in specially devised cases.

Mr. Keith went to Costa Rica when a young man and engaged himself in the railroad building and commercial developments which have brought Costa Rica to the front rank among Central American republics. Foreseeing the great possibilities of tropical fruit in northern markets, he was instrumental in organizing the United Fruit Company which now operates the largest fleet of steamships under the American flag. Under Mr. Keith's direction the growing, transporting and marketing of bananas has been brought to such high efficiency, that this wholesome fruit of the torrid zone can now be purchased cheaply the year round in every city, town and village in the United States. The banana is grown in the humid lowlands. The great plantations of the United Fruit Company have been cleared from dark and dripping jungle; problems of sanitation similar to those encountered in building the Panama Canal have been met and solved; railroads have been laid across morasses; towns and cities have risen where before there were a few palm-leaf huts of squalid Indians.

It was in clearing a great banana plantation at Mercedes that the remains of a prehistoric city were found. Mr. Keith at his own expense, carried on excavations for several years at this site, and his interest increasing with the finds, he extended the archæological survey to cover other parts of Costa Rica. Thus it happens that there is opened to the scientific world, results of exploration in the humid lowland areas of Central America to add to the results previously gained from the more easily explored arid districts.

a storm swept over Mercedes and upturned a great tree. The next day in the earth that still clung to the upturned roots, he caught the glitter of gold and upon examination thirty pieces of ancient gold craft were found. The great tree had grown over the grave of some forgotten chief and its roots had enmeshed the funeral offerings. In addition to long continued excavations at Mercedes, supplementary work was carried on in other parts of Costa Rica. Many fine examples of art in gold were found in the region of Rio General.

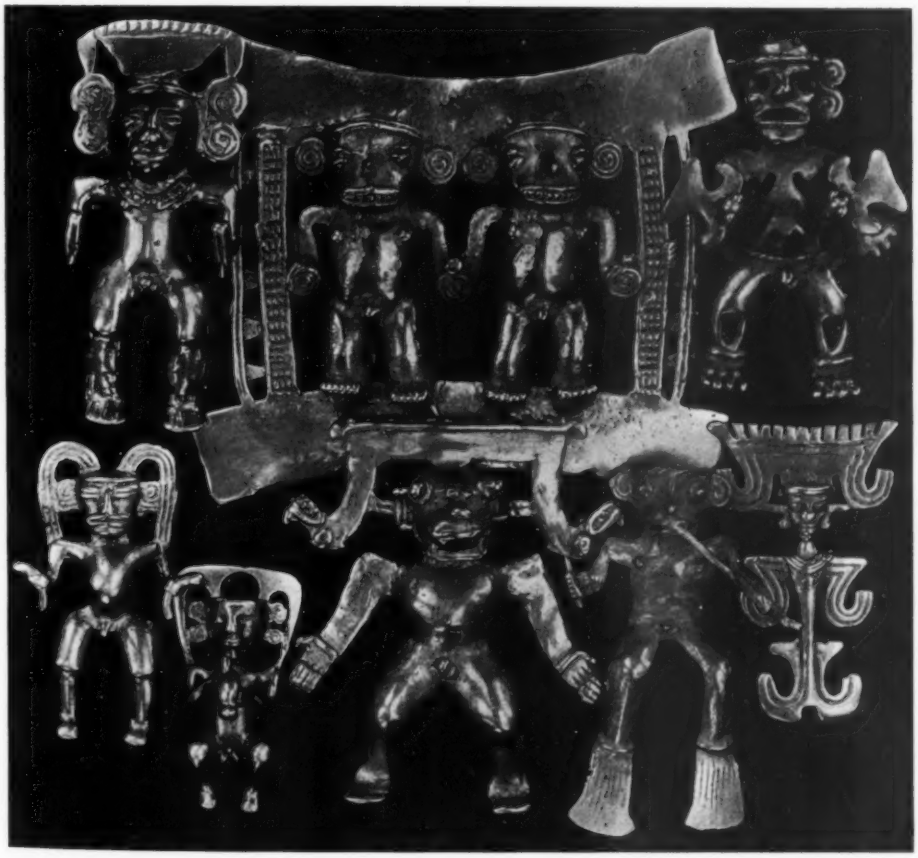


Birds of prey are often figured in a simple but forcible fashion, with spread wings and tail and outstretched talons. These pieces have a ring at the back for suspension and were probably worn about the neck as ornaments

The technical processes of the ancient goldsmiths are admirably illustrated in Mr. Keith's collection. Many ornaments including the disk-shaped gorgets are made of beaten gold and have designs in repoussé. Others are castings. Of the latter some examples were cast in one piece and others in several pieces afterwards welded together. The patterns were made of resin or wax. They were enclosed in clay and the resin or wax was melted out and a mould was left. Hollow castings were made by building the patterns over a core of clay held in position by sprues or pins. In a number of specimens a portion of the clay core can still be seen. The rough castings were finished off by hammering and burnishing. Two kinds of gold plating were accomplished by the ancient metal-workers. One is a heavy plating made over copper and the other a very thin and impermanent gilding. It has been suggested that the molds were lined with leaf gold or sprinkled with gold dust before the copper was poured in. The metal runs from pure gold to pure copper with all the intermediate alloys. In addition to copper, silver and even platinum may occur as a natural alloy in the gold. Bronze was apparently not made. The gold was obtained from placer deposits that sometimes yielded nuggets of good size.

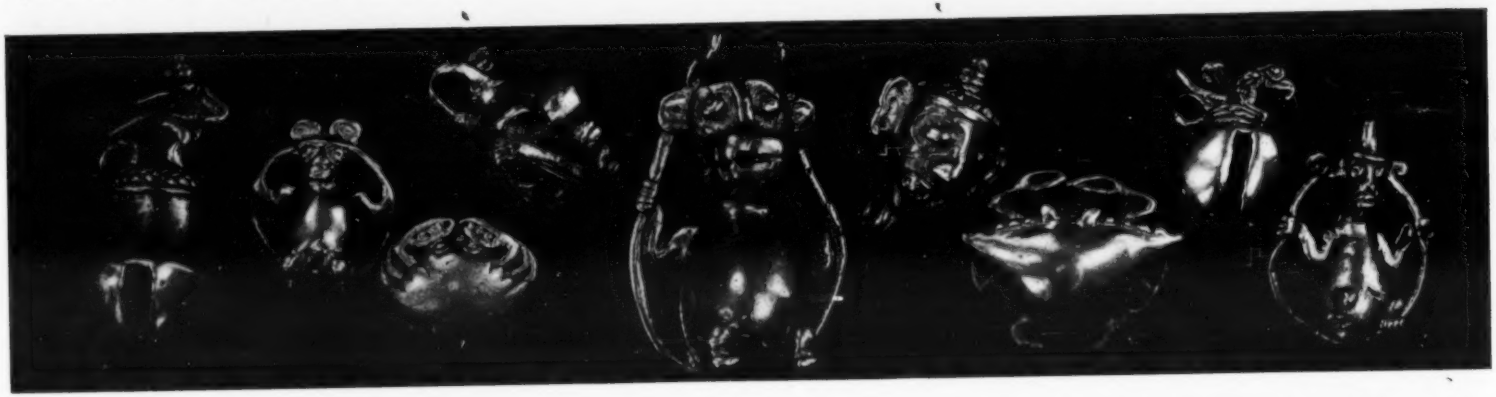
The range of natural forms is well covered. Human beings are represented

The gold objects cover the range of animal forms in the Isthmus. The tapir is represented in one specimen while the jaguar and the monkey and various reptiles are favorite subjects. Sometimes composite forms are seen



Human beings are represented either singly or in pairs. Various activities are shown. Headdresses and necklaces are on the otherwise nude subjects, and objects such as bells are held in the hand. A remarkable specimen [upper right-hand corner] shows a man being devoured by two vultures

Bells served as money in ancient America. The sleigh bell or hawk's bell was made in exactly the form in which we know it and was often modified so as to represent animal heads, birds, monkeys and crabs

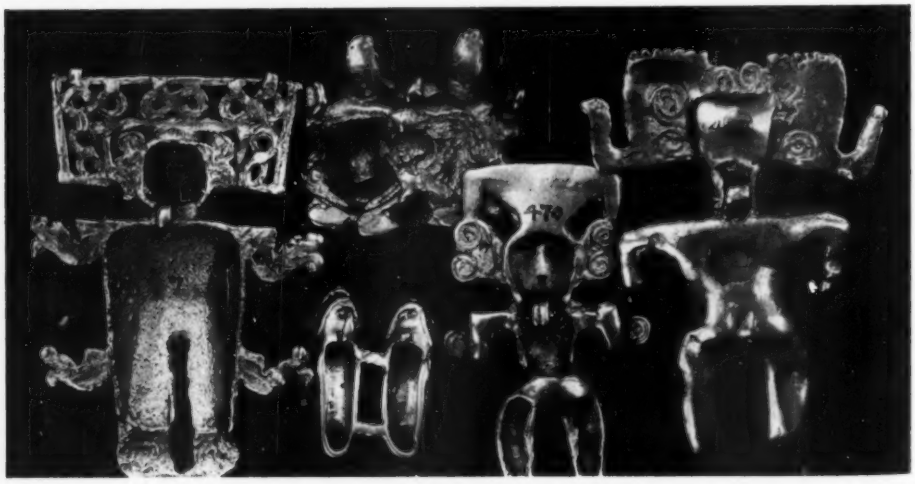


Some of the most interesting pieces of Costa Rican gold work are made to represent frogs and lizards. Often these are amulets or brooches

THREE REMARKABLE PIECES OF ANCIENT GOLD

The most elaborate specimens in the Keith collection show bird and animal gods ornamented with the sacred crocodile heads. The three animal-gods figured above are in the act of devouring a fish, a snake and a lizard respectively

Although naively drawn. there is an unmistakable touch of nature in many examples. The student of primitive peoples sees in these ancient pieces of gold craft the close relations existing between man and the animal life that surrounded him. The animals that were powerful or possessed some special efficiency were transformed into gods



Mr. Keith's collection illustrates excellently the ancient processes such as hammering, engraving and hollow casting

with peculiar headdresses and with various objects carried in the hands. Sometimes they are joined in pairs. Many of the most beautiful amulets are frogs arranged either singly or in groups of two or three. These little figures are all provided on the under side with a ring for suspension. Lizards, turtles and crocodiles or alligators, are also represented in amulets. Clamshells were used as beads and clever imitations of them were made in gold. The monkey is an interesting subject, and we find it treated in the gold work much as it is treated in the stone sculptures.

Perhaps the most numerous amulets are those which figure birds with outstretched wings. Many of them are of the vulture and harpy eagle types. Others represent the gull, the man-of-war bird and the parrot. An interesting series of ornaments shows the amalgamation of two birds into a single figure. Among the unique examples in the Keith collection are a large spider with egg ball attached, a fine figure of the tapir, a curiously conventionalized butterfly, and a number of pins and odd pendants which represent highly modified crocodiles and monkeys.

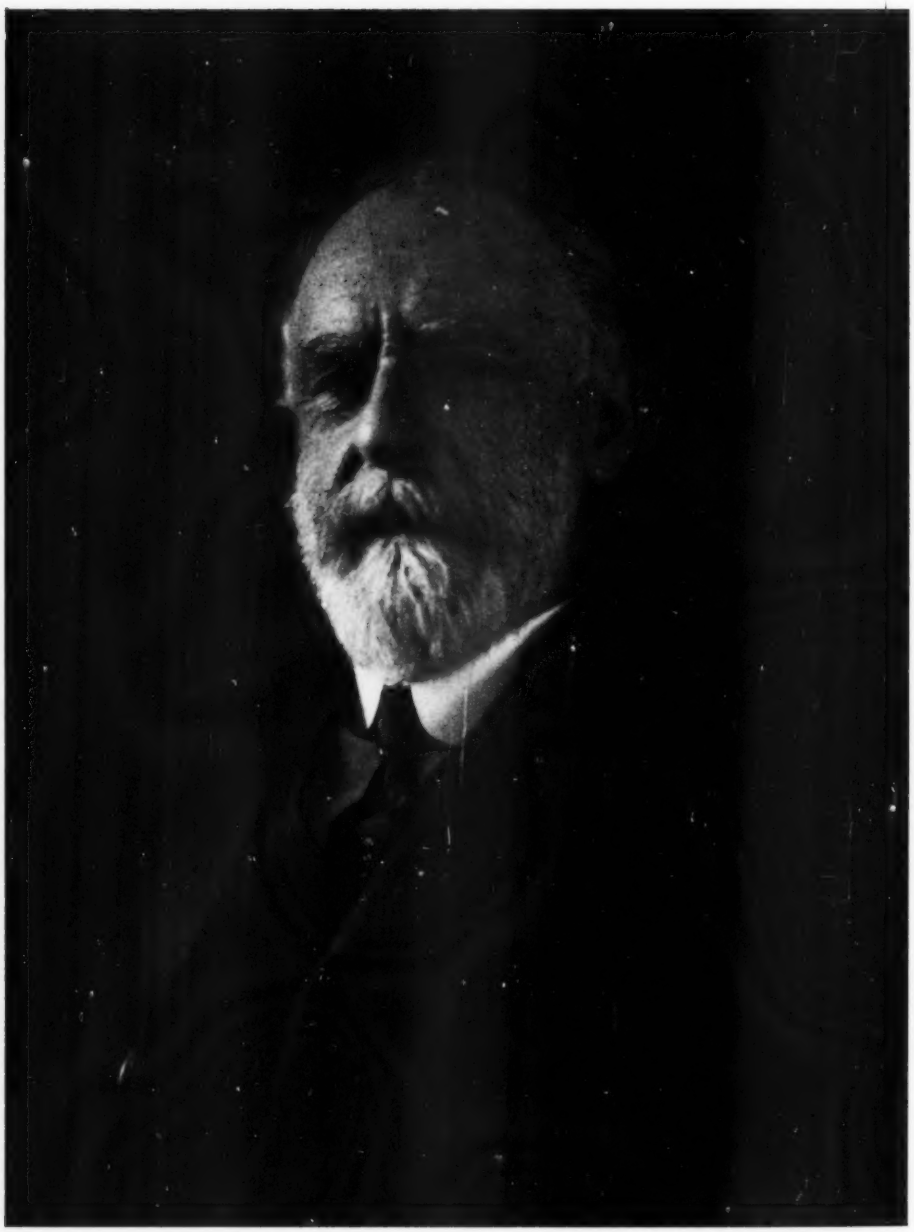
The more elaborate specimens of ancient Costa Rican gold work deal with religious subjects. In particular the crocodile was deified and elaborated. It is often represented with a human body and a characteristic animal head. The profile of the crocodile head is used to embellish other forms. In pottery and stone sculpture as well, the crocodile motive is very prominent, while the jaguar and various sorts of birds are seen in many examples.

Perhaps the finest specimens of gold work in the Keith collection are those which show some of the highly conventionalized figures of gods. One series of such figures have canopies made of rectangular gold plates on standards. Others show the animal-god in question performing some act. Examples of this are two bird divinities, one with a lizard and the other with a flying fish in its mouth. In both cases the headdresses of these deified birds are elaborated with the profile head of the crocodile. In another instance a bird is shown with a fish in its mouth while four fish are attached to its head and legs.

Gold and copper bells served as a medium of exchange among the peoples of Mexico and Central America. They were all of the hawk's bell type. The gold bells of Costa Rica are exquisite examples of metal work. Many of them are modeled in the form of birds, monkeys and grotesque heads.

Most of the tribes of Costa Rica belong to the Chibchan linguistic stock and are connected with the Indians of Colombia. The languages however are differentiated to such an extent as to be mutually unintelligible. The political units at the time of the Conquest were small and there was no centralized government. The Nicoyan peninsula in northwestern Costa Rica and adjacent territory near Lake Nicaragua was inhabited by the Chorotega or Mangue Indians of a different linguistic stock. Intrusive Nahuan tribes from the highlands of Mexico were also found here.

Gold becomes scarcer as we go north from Colombia and Panama but identical processes of metal-working were in use as far north as Central Mexico. The succession and interrelation of the various ancient civilizations have only been roughly blocked out for the Isthmian area. There is no doubt that the artistic development extended over many centuries. Many features of art and technology can be traced to Mexico and it is hoped that future study will bring to light connections with Peru.



FREDERIC WARD PUTNAM, 1839–1915

Professor Putnam was one of the most eminent American anthropologists. He had official connection with many learned societies and had been decorated by the French Government with the Cross of the Legion of Honor. It is directly due to his influence that anthropology has come to occupy its present high position in American museums, making these institutions the instrument of field research. Professor Putnam was an optimistic believer that proofs of man's presence in America during the last period of glaciation will ultimately be found

FREDERIC WARD PUTNAM

By Clark Wissler

THE founder of anthropological research in the American Museum, Frederic Ward Putnam, died at his home in Cambridge, Massachusetts, Saturday, August 14, 1915. He was born in Salem, Massachusetts, April 16, 1839. He attended the Lawrence Scientific School of Harvard where he studied under the distinguished Agassiz. From 1857 to 1864 he was Agassiz's laboratory assistant, and later he was curator of Vertebrata in the Essex Institute, Salem, and also curator of ichthyology in the Boston Society of Natural History. Thus at an early age he began an unusual career in that he served a number of institutions simultaneously.[1]

Professor Putnam's interest in anthropology was a later development and seems to have had its origin in his museum experience. He was above all a genius in museum development and is far and away the most conspicuous figure in the history of American museums. Anthropology as we now use the term had scarcely come into existence when he took it up. Doubtless he saw in America a great undeveloped field for research and particularly for the investigation of the antiquity and the origin of man. At that time such museums as there were, contented themselves with receiving gifts of such random anthropological specimens as came to their doors, but Professor Putnam's idea was to make the museum an instrument of field research, to go out with trained men, collect, and study the evidences of man's antiquity on the ground. This is the modern idea and it can truthfully be said that Putnam is the father of municipal anthropological research institutions in America.

The Peabody Museum in Cambridge as it stands to-day is due to his leadership; his coming to the American Museum resulted in the development of anthropology as a department of research and the beginning of a policy of extensive systematic field investigation. It was Professor Putnam who encouraged the late Marshall Field to establish in Chicago a great museum which now bears his name, and it was Professor Putnam who guided its department of anthropology through the formative period. Later, he organized a department of anthropology and a museum at the University of California where he was director for several years. One of his strongest traits was his genius in interesting wealthy men in museum development. In almost equal measure he had a way of inspiring capable young men. Among those whose early anthropological careers were under his guidance are Franz Boas, Roland B. Dixon, George A. Dorsey, Alice C. Fletcher,

[1] Some of the positions Professor Putnam has held in corporations and institutions are as follows:— curator of ornithology, Essex Institute, Salem, Massachusetts, 1856–1857; assistant to Professor Louis Agassiz, Harvard University, 1857–1864; curator of Vertebrata, Essex Institute, 1864–1866; superintendent of the Essex Institute Museum, 1866–1871; superintendent Museum East Indian Marine Society, 1867–1869; director Museum Peabody Academy of Science, 1869–1873; state commissioner of fish and game, Massachusetts, 1882–1889; curator of ichthyology, Boston Society of Natural History, 1859–1868; permanent secretary, American Association for the Advancement of Science, 1873–1898; assistant Kentucky Geological Survey, 1874; instructor, Penikese School of Natural History, 1874; assistant to United States Engineers in surveys west of 100th meridian, 1876–1879; assistant in ichthyology, Museum of Comparative Zoölogy, 1876–1878; curator of the Peabody Museum, 1875–1909; honorary curator, 1909; honorary director, 1913; Peabody professor of American archæology and ethnology, Harvard University, 1886–1909; Peabody professor emeritus, 1910; chief of department of ethnology, World's Columbian Exposition, Chicago, 1891–1894; curator of anthropology, American Museum, New York, 1894–1903; professor of anthropology and director of the Anthropological Museum of the University of California, 1903–1909; professor emeritus of anthropology, 1909.

George Byron Gordon, M. R. Harrington, A. Hrdlička, A. L. Kroeber, Charles W. Mead, Warren K. Moorehead, George H. Pepper, Marshall H. Saville and Harlan I. Smith.

When Professor Putnam was invited to the American Museum by President Morris K. Jesup, there had as yet been no important anthropological expeditions. At once Professor Putnam began to solicit funds and soon had important work under way. Among the most important expeditions were the Hyde explorations in the Southwest, resulting in the famous discoveries at Pueblo Bonito by George H. Pepper; the Loubat Mexican expedition by Marshall H. Saville; the organization of the Jesup North Pacific work under the direction of Professor Boas; and the Villard expedition to Peru under A. F. Bandelier.

Under his own personal supervision were the exploration of the Delaware Valley for traces of early man and the archæological investigations in the vicinity of New York Bay. The field work for the former was conducted by Ernest Volk, and the latter by M. R. Harrington. Each of these undertakings yielded important results and their published reports are conspicuous in anthropological reference literature. In these, as in all other undertakings, Professor Putnam's chief work was administrative, but it was the kind of work that made possible these several researches bearing the names of others.

In the main the history of Professor Putnam's call to the American Museum can be read in the following quotation, from his own report to the trustees of the Peabody Museum:

> During the spring the trustees of the New York Museum offered to me the position of curator of the department of anthropology of that museum, with the understanding that I was to reorganize the department on a broad basis, to plan for its future development and for exploration, and to direct its work. The opportunities here offered were in every way worthy of my most earnest consideration; but I felt that I could not leave the Peabody Museum to which for the last twenty years I have given my thought and my work. After several conferences with the trustees of both museums and with the president of the University, it was finally arranged that I should continue my duties in Cambridge both in the museum and in the college, and should also accept the position of curator of anthropology in the New York Museum to which I should give one week each month. Thus since the first of June I have held both positions, and have so arranged my duties as to take one week of each month for my work in New York. This arrangement has thus far proved possible and I trust satisfactory to all concerned. My field of usefulness is certainly increased, and I am confident that mutual benefit will result from thus bringing into perfect harmony two important centres of anthropological research. The aims of the two museums are different, and perfect coöperation and harmony between them cannot fail to result in benefit to science.— F. W. PUTNAM

A continuation of the history of Professor Putnam's connection with the American Museum is set forth in the following quotation from a report of 1903 by Morris K. Jesup, the late president of the American Museum:

> Professor Putnam was appointed curator of anthropology in the spring of 1894. At that time the exhibition of the collections relating to Man was confined to what is now the shell hall on the fifth floor, and the western half of the bird gallery on the third floor. There had been no systematic explorations, no scientific publications, and the head of the department had but a single assistant. Within these ten years the department has grown until, at the present time, the collections occupy eight large exhibition halls and twelve storage rooms. Explorations have been made throughout America and parts of Asia, the scientific publications fill a score of volumes, and the present department staff includes no less than seven men of recognized scientific attainments.— MORRIS K. JESUP

As we are reviewing Professor Putnam's work while he was connected with the American Museum only, it is not necessary to consider the expeditions sent out under his direction from other institutions. Yet, note may be made of the fact that he is the most conspicuous figure in Ohio mound exploration and really began what the state of Ohio is now carrying out so well — namely, a systematic archæological exploration of the entire state.

Although living to an advanced age Professor Putnam was an enthusiastic anthropologist to the very last. Just a few weeks before his death the writer received from him a long letter in his own handwriting discussing the problem of man's antiquity in America. Notwithstanding the disappointments in the pursuit of this problem, he was still cheerfully optimistic and firm in the faith that we should ultimately find satisfactory proof of man's presence in America during the last period of glaciation.

His death marks the end of a long and interesting career. To him was granted the privilege of living happily and long enough to see the results of his striving; but what is still more, he continues to live in the hearts of the many men and women he has helped to something better than they could have attained alone.

MUSEUM NOTES

A RARE collection of archæological objects from the Department of Ica, Peru, was recently purchased by Mr. A. D. Juilliard and presented to the Museum. This collection represents the results of numerous expeditions during the last nine years by Mr. Manuel Montero to the desert regions to the south and west of Ica. These visits to the prehistoric burial grounds were his vacations, and every object in the collection was excavated by him. The most notable objects are nine large shawl-like garments covered with conventionalized figures in embroidery. The beautiful color schemes seen in these textiles make them a joy to the artist, and they will doubtless be copied eagerly by the numerous art students who make constant use of the Museum collections. Besides these shawl-like garments there are many smaller pieces of cloth which are highly ornamented.

The metal work of these ancient people is represented by objects in silver and copper. There are several pairs of large silver ear-plugs, ornamented with embossed figures of birds, silver tweezers also ornamented with raised bird figures, and a number of shawl pins with finely executed figures of birds and pumas on the upper ends. The other objects in the collection consist principally of the women's workbaskets, with spindles and various colored threads, a loom with cloth in process of weaving, feather ornaments, slings, musical instruments and a few choice pieces of pottery.

THE twentieth anniversary of the foundation of the New York Botanical Garden at Bronx Park was celebrated during the week of September 6. As early as 1888 the need of a botanical garden in the City of New York was considered. In 1889 the Torrey Botanical Club obtained the consent of the Department of Public Parks to the establishment of such an institution. By 1895 the necessary sum of $250,000 had been subscribed, and the site of the Garden covering an area of 250 acres had been selected. Through the concerted efforts of the several committees of the Torrey Club the Botanical Garden in twenty years has acquired such an extensive number of collections that an additional appropriation of land has been made necessary, totaling in the entire reservation nearly four hundred acres.

Among the more important features of the week's program were the several sessions for the reading of scientific papers, inspection of various botanical exhibits, and visits to Staten Island and to the Brooklyn Botanical Garden.

NEWS of the safety of Vilhjálmur Stefánsson, leader of the Canadian Arctic expedition,

SQUARE-LIPPED RHINOCEROS, THE SO-CALLED "WHITE RHINO" OF AFRICA

Shot by Mr. John H. Prentice north of the Lado Enclave, Bahr-el-Ghazal Province, Anglo-Egyptian Sudan, and presented to the American Museum in mounted form. The work of mounting was done by Mr. James L. Clark as the first of the specimens for the Museum's white rhino group

and of his success in finding new land north of Prince Patrick Island, has just been received. After a dangerous trip of seven hundred miles northward across the ice from Martin Point on the mainland, Stefánsson and his two companions were able to reach Bank's Island. Here the winter was spent and during the next spring exploration toward the north resulted in the discovery of land which may or may not be connected with the supposed large land mass north of Alaska and Siberia. In the meantime the Southern Party of the expedition has been carrying on work in geology, topography and ethnology along the northern coast of Canada from the Mackenzie River Delta to Coronation Gulf. Because of the great delay through the loss of the "Karluk" it is planned to continue the explorations until 1917. A base camp for the northern party has by this time probably been established at the northern end of Prince Patrick Island. This will allow a wide radius for exploration over the ice during 1916.

THE Collins-Day South American expedition previously announced from these pages, presented on its recent return large collections of birds and mammals to the American Museum. The interesting itinerary of the expedition will be reported in a succeeding issue of the JOURNAL.

ON June 24, the new orange, white and blue flag designed for the municipal buildings of the City of New York was hoisted on the American Museum building, where it has since floated on the tower of the east wing. The colors under which the new Constitution was founded in 1626 have again become the official colors of the City, their renewed adoption taking place on the 250th anniversary of the installation of the first Mayor and Board of Aldermen. At the ceremonies in commemoration of this anniversary and of the adoption of the ancient civic emblem as a new flag of the City, the American Museum was represented by the following delegates: Messrs. Cleveland H. Dodge, Frederic A. Lucas and Bashford Dean. The addresses of the occasion were by Governor Charles S. Whitman, Mayor John Purroy Mitchel, William Robert Shepherd, professor of history at Columbia University, and Dr. John H. Finley, president of the University of the State of New York.

DR. ROBERT H. LOWIE and four members of the Museum resident in California, Dr. Jaime De Angulo, and Messrs. W. B. Bourn, William H. Crocker and William Kennon Jewett, were appointed by the Museum and the appointment officially confirmed by Marcus M. Marks, president of the Borough of Manhattan, to act as delegates on Manhattan Day, at the Panama California Exposition in San Diego, August 9, and the Panama Pacific Exposition in San Francisco, August 19.

THE third and final shipment of the Lang-Chapin collections from the African Congo was received at the Museum in August. Recent word from Mr. Lang indicates that he will probably arrive in New York about the middle of October.

THE American Dahlia Society in coöperation with the Horticultural Society of New York gave with gratifying success their first annual exhibition of dahlias at the American Museum of Natural History, September 24–26.

DURING the summer President Osborn accompanied the new Assistant Secretary of the Interior, Hon. Stephen Tyng Mather, on an excursion in the High Sierras, from the region of the Sequoia National Park westward. The tour included the ascent of Mount Whitney and extended to Owen's Lake on the east of the Sierras, from which point the party passed northward and took part in the opening of the reopened roadway along the line of the old Tioga Trail. The object of Mr. Mather's tour was to survey the region lying west of the Sequoia National Park with a view to its enlargement to include the superb region around Mount Whitney.

THE Museum was represented at the recent meeting of the American Association for the Advancement of Science by Professor Henry Fairfield Osborn and Dr. W. D. Matthew, who took part especially in the conferences and discussions on the past history of the Pacific coast region during Miocene time. The meeting was followed by an expedition to the region of the Mohave Desert where fossil beds containing horses, camels, and other extensive Miocene forms have been discovered within the last few years. Professor John C. Merriam of the University of

Shot by Mr. John H. Prentice done by Mr. James L. Clark as the first of the specimens for the
form. The work of mounting was done by
318

California, who led this excursion, has been instrumental in presenting to the Museum recently several very fine skeletons of the mammals from the Rancho La Brea deposits near Los Angeles, including a complete sabre-tooth tiger and a complete wolf, which are now being mounted as an addition to the group exhibit prepared two years ago.

A SERIES of enlargements of the remarkable photographs taken by the Australasian-Antarctic expedition under Sir Douglas Mawson has been placed on temporary exhibition in the west assembly hall of the Museum.

MR. N. C. NELSON assisted by Mr. E. W. Morris of the University of Colorado, has completed for the time being the survey and excavation of the Galisteo ruins. At San Marcos, one of the largest of the ruins south of Santa Fé, Mr. Nelson excavated 475 rooms. Besides the San Marcos ruin five other ruins were excavated. Mr. Nelson will also visit the Mesa Verde country to inaugurate joint work between the University of Colorado and the American Museum.

THERE has been on exhibition during the past few months in the west assembly hall of the Museum a collection of paintings and bronzes by William de la Montagne Cary from studies made by him in the West between 1861 and 1874. Mr. Cary's sketches are unusually interesting from the historic standpoint. They record the phase of western life when the buffalo was still on the Plains and the Indians were living according to their old ways.

PROFESSOR A. L. KROEBER of the University of California spent the month of July and part of August among the Zuñi of New Mexico where he secured over nine hundred specimens illustrating the everyday and religious life of these people. He made a detailed study of their system of relations and the terms employed to denote relationship.

DR. CLARK WISSLER, curator of the department of anthropology, has spent the summer in an intensive study of the religious ceremonies of the Pawnee, with the aid of James Murie, the religious leader and chief of the tribe. Mr. Murie is able to read and write not only English but his own language as well, using for the purpose an adapted form of our ordinary alphabet.

ATTENTION has already been called in the notes of the JOURNAL to the remarkable Laysan Island group in the University of Iowa. The photograph published in this number (page 266) represents one-tenth of the whole cyclorama. Laysan Island in the mid-Pacific has a surface of sand and "phosphate" rock and is encircled by an irregular series of coral reefs. It has no human inhabitants but in 1902 was said to be populated by nearly ten million birds.

The group reconstructs this island, attempting to show the real conditions on the island and the twenty-four species of birds nesting there. The canvas (138 ft. long) was painted by Mr. C. A. Corwin and the foreground (400 sq. ft.) was built by Mr. Homer R. Dill, requiring three years to mount the many birds and make the more than fifty thousand artificial leaves and the grasses used in the construction.

THE annual meeting of the National Association of Audubon Societies will be held at the American Museum Tuesday, October 26. Among other features there will be an exhibition of motion pictures by Mr. Herbert K. Job, who was sent by the Association on a tour of inspection of the bird reservations in Florida and Louisiana. It was during this trip that Mr. Job was detailed by the National Association as Colonel Roosevelt's photographer when the latter inspected the bird islands off the Louisiana coast, made reservations during his presidency.

MRS. WILLIAM M. IVINS has recently presented to the Museum a very valuable collection of baskets from Arizona, California and British Columbia.

DURING the past summer Mr. Roy C. Andrews spent several weeks in the Adirondack Mountains securing specimens and material for a group of Virginia deer which will be placed in the North American mammal hall of the Museum. The site selected for field study for the group was Shingle Shanty Stream on the Brandreth Preserve.

MRS. WILLIAM CHURCHILL, who was born in Samoa and lived there for many years, has presented to the Museum a large collection of photographs and ethnological specimens illustrating the native life of the Samoan Islands.

The American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

Open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people. It is dependent upon private subscriptions and the fees from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members	$ 10	Patrons	$1,000
Sustaining Members (annually)	25	Associate Benefactors	10,000
Life Members	100	Associate Founders	25,000
Fellows	500	Benefactors	50,000

Guides for Study of Exhibits are provided on request to members and teachers by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Technical Publications of the Museum comprise the *Memoirs*, *Bulletin* and *Anthropological Papers*, the *Memoirs* and *Bulletin* edited by J. A. Allen, the *Anthropological Papers* by Clark Wissler. These publications cover the field and laboratory researches of the institution.

The Popular Publications of the Museum comprise the JOURNAL, edited by Mary Cynthia Dickerson, the *Handbooks*, *Leaflets* and *General Guide*. The following list gives some of the popular publications; complete lists, of both technical and popular publications, may be obtained from the Librarian.

POPULAR PUBLICATIONS

HANDBOOKS

NORTH AMERICAN INDIANS OF THE PLAINS. By Clark Wissler, Ph.D. *Paper, 25 cents; cloth, 50 cents.*

INDIANS OF THE SOUTHWEST. By Pliny Earle Goddard, Ph.D. *Paper, 25 cents; cloth, 50 cents.*

ANIMALS OF THE PAST. By Frederic A. Lucas, Sc.D. *Paper, 35 cents.*

ILLUSTRATED GUIDE LEAFLETS

GENERAL GUIDE TO THE COLLECTIONS. New edition issued December, 1914. *Price, 25 cents.*

THE COLLECTION OF MINERALS. By Louis P. Gratacap, A.M. *Price, 5 cents.*

NORTH AMERICAN RUMINANTS. By J. A. Allen, Ph.D. *Price, 10 cents.*

THE ANCIENT BASKET MAKERS OF SOUTHEASTERN UTAH. By George H. Pepper. *Price, 10 cents.*

PRIMITIVE ART. *Price, 15 cents.*

THE BIRDS OF THE VICINITY OF NEW YORK CITY. By Frank M. Chapman, Sc.D. *Price, 15 cents.*

PERUVIAN MUMMIES. By Charles W. Mead. *Price, 10 cents.*

THE METEORITES IN THE FOYER OF THE AMERICAN MUSEUM OF NATURAL HISTORY. By Edmund Otis Hovey, Ph.D. *Price, 10 cents.*

THE HABITAT GROUPS OF NORTH AMERICAN BIRDS. By Frank M. Chapman, Sc.D. *Price, 15 cents.*

THE INDIANS OF MANHATTAN ISLAND AND VICINITY. By Alanson Skinner. *In preparation.*

THE STOKES PAINTINGS REPRESENTING GREENLAND ESKIMO. *Price, 5 cents.*

BRIEF HISTORY OF ANTARCTIC EXPLORATION. *Price, 10 cents.*

TREES AND FORESTRY. By Mary Cynthia Dickerson, B.S. *A new edition in course of preparation.*

THE PROTECTION OF RIVER AND HARBOR WATERS FROM MUNICIPAL WASTES. By Charles-Edward Amory Winslow, M.S. *Price, 10 cents.*

PLANT FORMS IN WAX. By E. C. B. Fassett. *Price, 10 cents.*

THE EVOLUTION OF THE HORSE. By W. D. Matthew, Ph.D. *Price, 20 cents.*

REPRINTS

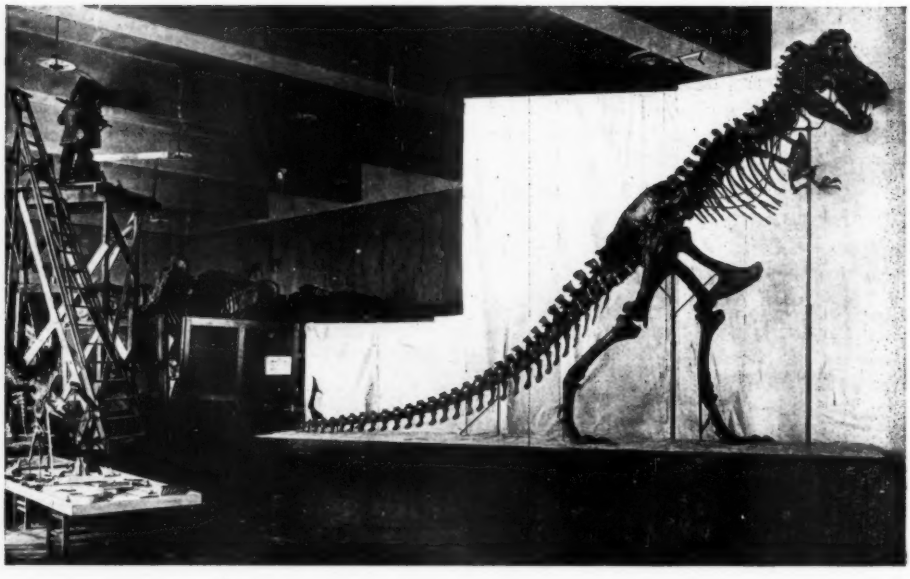
THE GROUND SLOTH GROUP. By W. D. Matthew, Ph.D. *Price, 5 cents.*

METHODS AND RESULTS IN HERPETOLOGY. By Mary Cynthia Dickerson, B.S. *Price, 5 cents.*

THE WHARF PILE GROUP. By Roy W. Miner, A.B. *Price, 5 cents.*

THE SEA WORM GROUP. By Roy W. Miner, A.B. *Price, 10 cents.*

THE ANCESTRY OF THE EDENTATES. By W. D. Matthew, Ph.D. *Price, 5 cents.*



Photographing the recently mounted skeleton of the giant dinosaur Tyrannosaurus, American Museum of Natural History